Chen Northern, Inc.

DRAFT

WASTE MATERIAL SAMPLING REPORT

NELLIE GRANT MINE

JEFFERSON COUNTY, MONTANA

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Prepared for:

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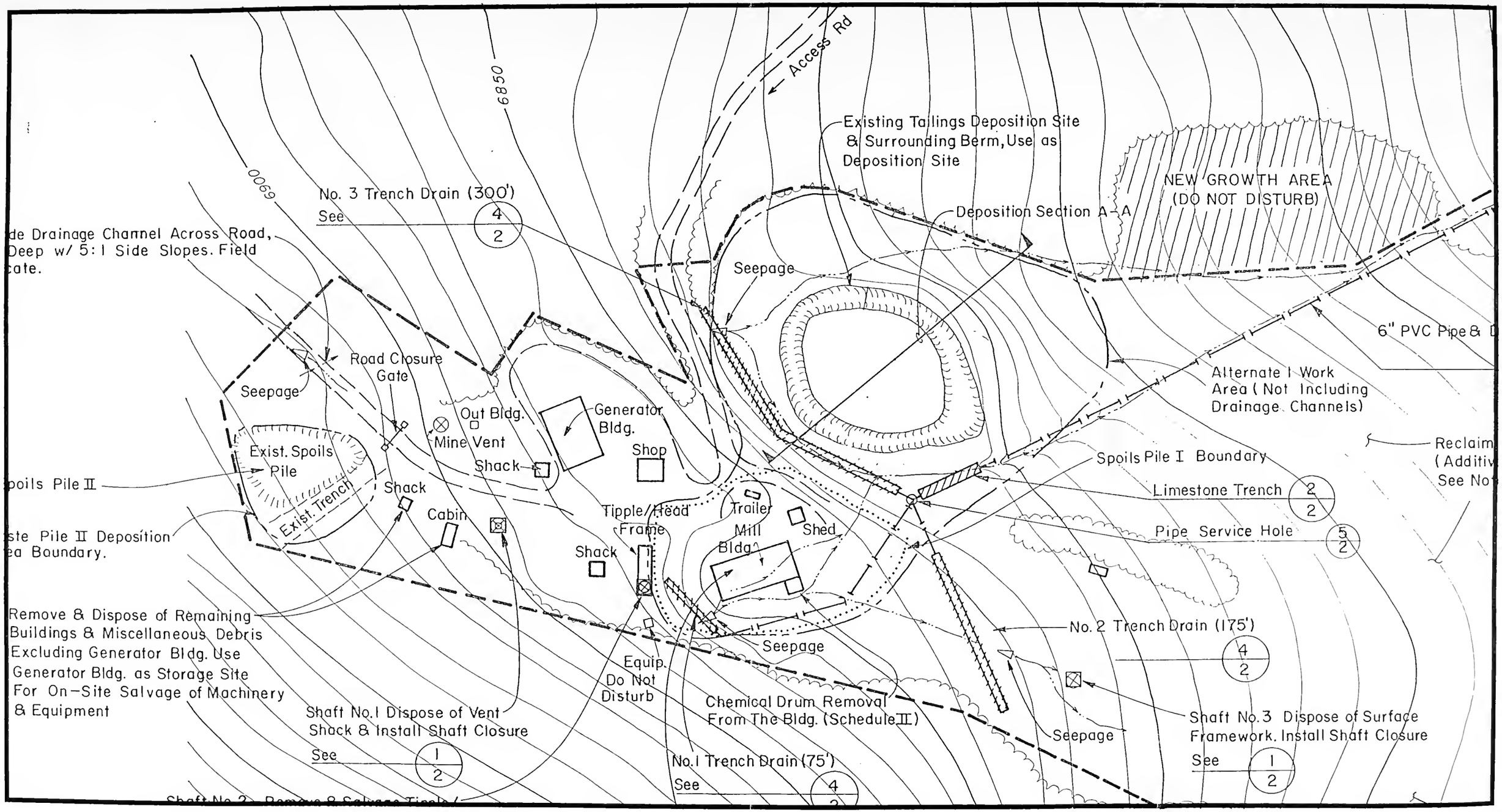
1.0 INTRODUCTION

Chen-Northern, Inc. (Chen-Northern) prepared this report for the Montana Department of State Lands, Abandoned Mine Reclamation Bureau (AMR). This report presents the data and findings resulting from waste material sampling and analysis completed at the Nellie Grant Mine, Jefferson County, Montana. This work was performed to determine if these waste materials would pose a significant threat to human health and the environment during mine reclamation activities and to identify disposal/disposition alternatives for these materials.

The Nellie Grant Mine is located approximately 13 miles southwest of Helena, Montana. The mine was operated sporadically from about 1880 to about 1980. Minerals recovered at the mine were primarily lead and silver. Sparrow Resources, Ltd. was the last operator at the site and employed a crusher and mill to extract minerals from ore. The mill used chemical flotation agents to aid in mineral recovery.

During a preliminary assessment of the mine site, Robert Peccia and Associates (Peccia) (a contractor to AMR) discovered fifteen 55-gallon barrels stored in an small addition to the mill building (Figure 1). Because of the unknown contents of the barrels and other possible waste sources at the site, AMR contacted Chen-Northern to locate, sample and analyze waste materials at the site.

The analytical results from waste material sampling were intended to provide adequate data to characterize the waste materials as hazardous or non-hazardous and to possibly provide the identity of the waste materials. Once the waste material characteristics were classified, alternatives for material disposal/disposition could be identified prior to allowing mine reclamation activities to proceed.



Plan Map of a Portion of the
Nellie Grant Mine, Jefferson County, Montana
FIGURE 1

Chen-Northern's objectives in the waste material sampling and analysis investigation were to:

- Identify the location of liquid and solid waste materials stored in or near buildings at the site during a site reconnaissance;
- Prepare a sampling site safety plan and develop an analytical testing scheme for the waste materials;
- Collect representative samples for laboratory analysis from each identified waste;
- Characterize the wastes and determine if the wastes are classified as hazardous; and
- Develop disposal alternatives for each waste.

This report first describes the methods we used to investigate the waste materials at the site. This section is followed by a section describing the results of investigatory activities. The final section of the report contains our conclusions and recommendations for the ultimate disposition of waste material at the Nellie Grant Mine.

2.0 METHODS

This section describes our methods in completing site investigatory activities. The following subsections discuss our initial site reconnaissance, development of a site safety plan and testing scheme, waste sampling and analyses and generation of disposition alternatives for the wastes.

2.1 SITE RECONNAISSANCE

A Chen-Northern project scientist completed a site reconnaissance on August 1, 1990. The purpose of the reconnaissance was to evaluate potential sampling hazards at the site and to identify the locations of waste material stored at the site. Our project scientist used site maps and site descriptions obtained from Peccia personnel to survey the site. In addition, a video tape was made during the reconnaissance and was subsequently shown to Chen-Northern laboratory and sampling personnel to inform them of potential hazards at the site.

Activities completed during the reconnaissance included the following:

- Inventorying the nature and approximate volume of wastes contained or spilled in or adjacent to the mill building addition, generator building and shop (Figure 1);
- Identifying the existence of product labels on all waste containers and recording the resultant information;
- Categorizing potential sampling safety hazards at the site; and
- Preparing maps of waste material storage areas.

2.2 SITE SAFETY PLAN AND ANALYTICAL TESTING SCHEME

Information obtained during the site reconnaissance was used to prepare a site safety plan for the imminent sampling event. In addition, product manufacturers and a former Sparrow Resources employee were contacted to determine the nature of potential waste material at the site (personal communication with Pat Bond, American Cyanamid and Mr. Kirk Miller, Chen-Northern, 1990) . The resultant information was incorporated into the site safety plan. In addition, our safety plan was developed in general accordance with OSHA regulations (29 CFR 1910.120).

The site safety plan also included sections on waste material sampling protocol. Our sampling objective was to produce a set of samples representative of the waste materials and suitable for analysis. A copy of the site safety plan prepared for the sampling event is contained in Appendix A.

Ms. Kathy Smit, Division Manager of Chen-Northern's Billings, Montana analytical laboratory, designed the testing scheme for the waste material samples. Ms. Smit relied on waste material inventory information obtained during the site reconnaissance, product information from manufacturers and on our corporate experience in waste characterization. Analyses for each sample were designed to determine if the source waste material is classified as a hazardous waste pursuant to 40 CFR Part 261 et al. (EPA, 1990) and to assist in identifying the source materials.

2.3 SAMPLING AND ANALYSIS

Chen-Northern field personnel completed sampling activities at the site on August 9 and 10, 1990. A total of 20 waste samples were obtained at locations depicted on Figures 2 and 3. Level C personal protective equipment and two vapor monitoring instruments were used by

the sampling crew throughout the sampling event to ensure worker safety. A self contained breathing apparatus (SCBA) and a self rescuer were also available at the site for use in an emergency.

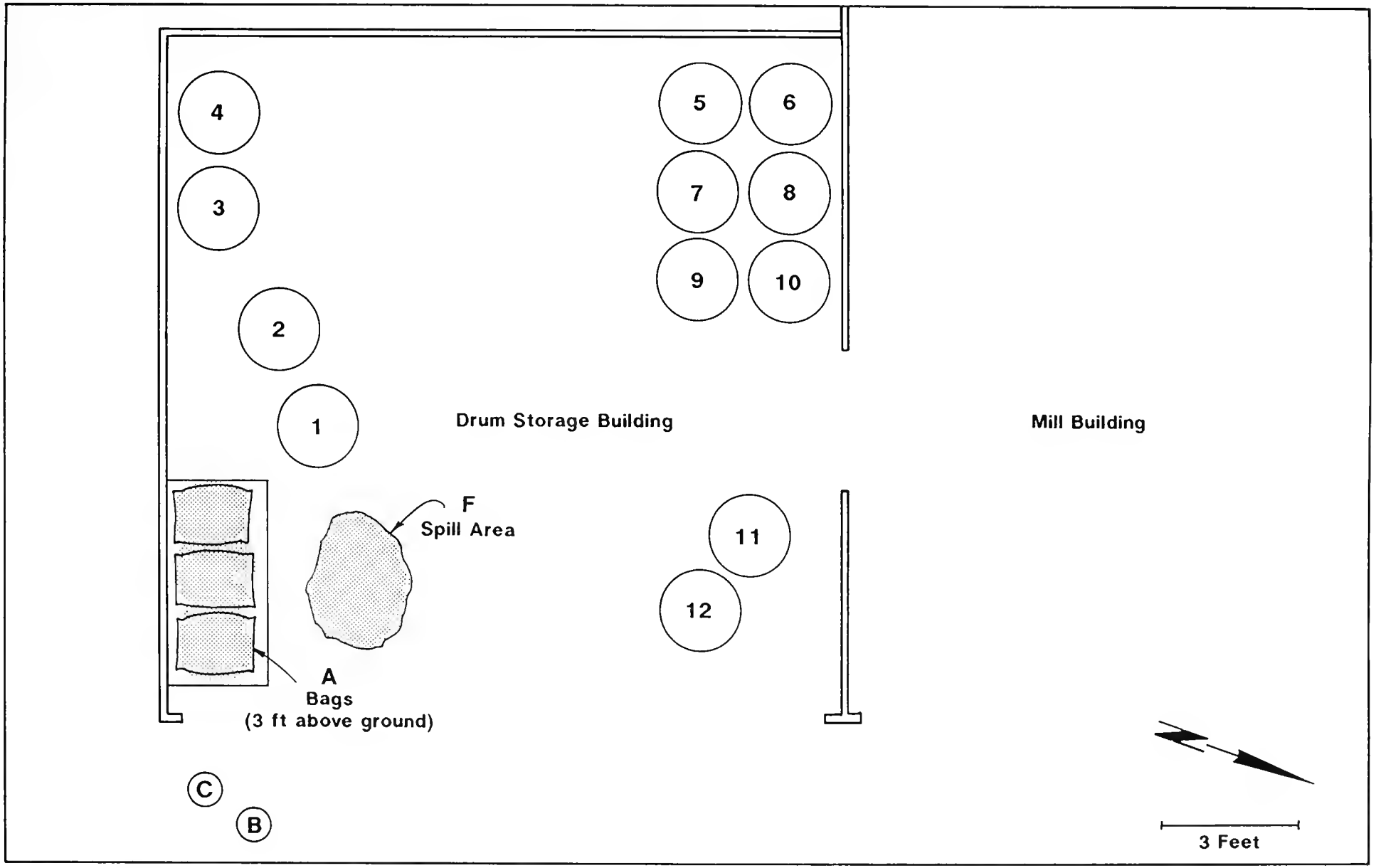
Prior to sampling the waste materials, the addition to the mill building was cordoned off with flagging to denote the sampling zone. A first aid station was established outside the sampling zone. Sampling procedures were completed in general accordance to the site safety plan (Appendix A) with the following exceptions:

- Waste container D (Figure 2) was not sampled because the container was apparently removed from the site sometime between the site reconnaissance visit and the sampling event; and
- Waste containers G (Figure 3) and sampling locations I and H (Figure 3) were added to the sample train to complete waste material characterization at the site.

2.4 WASTE MATERIAL IDENTIFICATION AND DISPOSITION ALTERNATIVES

Analytical results from the 20 waste samples were evaluated with respect to the characteristics of a hazardous waste and to a variety of possible source products. The characteristics of a hazardous waste include toxicity, ignitability, reactivity and corrosivity. A list of possible source products for the waste materials was generated during site reconnaissance and site safety plan development activities. Possible source products at the site include:

- *sodium sulfite anhydrous*
- *sodium isopropyl xanthate*
- *sodium silicate solution*
- *Aerofloat 340 Promoter (dithiophosphate family)*
- *Superfloc 330 (polyquaternary amine)*
- *methyl ethyl ketone (MEK)*

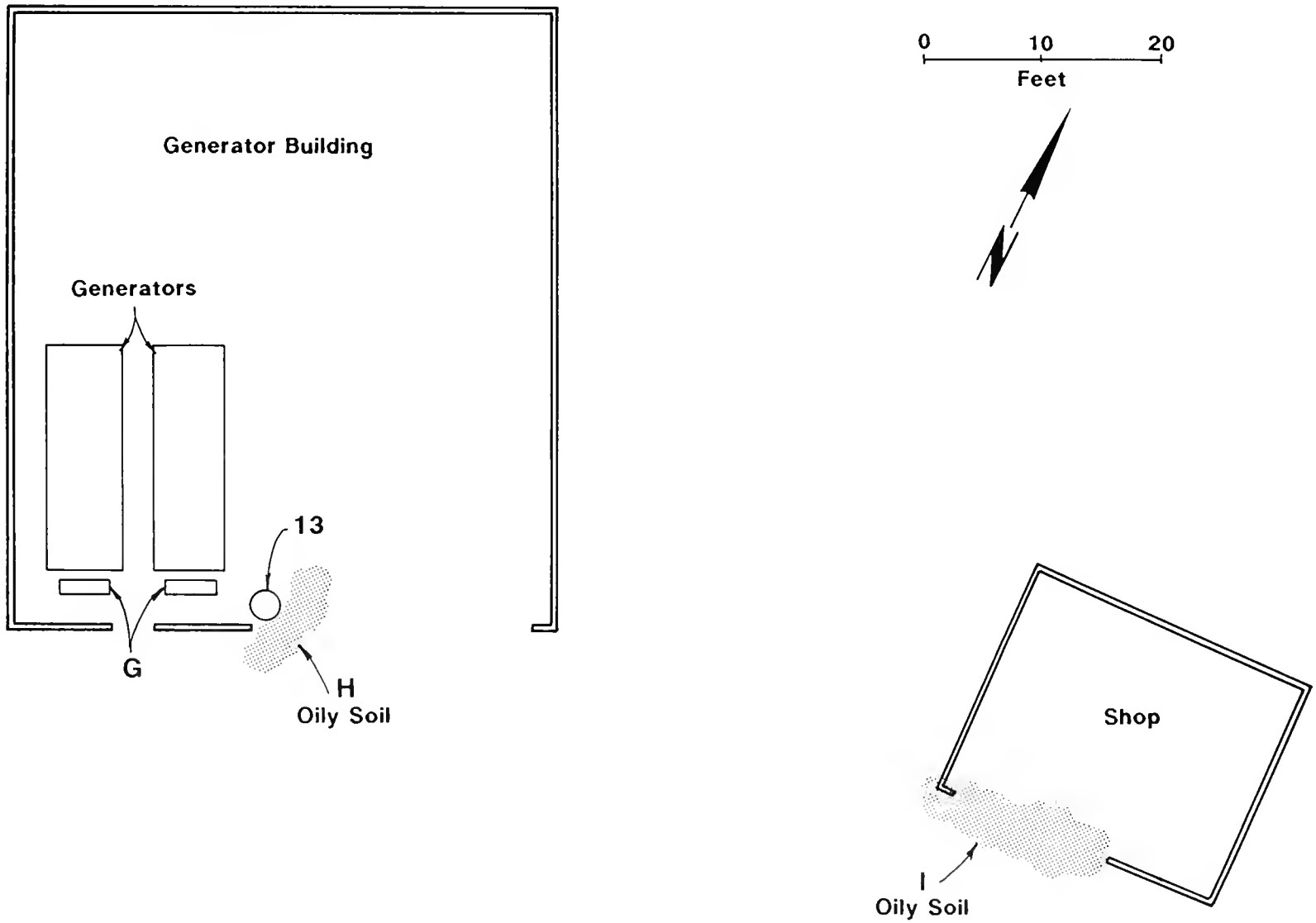


55 gallon Container

5 gallon Container

(see Table 1)

Sampling Stations
Drum Storage Building
Nellie Grant Mine, Jefferson County, Montana
FIGURE 2



(see Table 1)

Sampling Stations
Generator Building and Shop
Nellie Grant Mine, Jefferson County, Montana
FIGURE 3

- *methyl isobutyl carbinol (MIC)*
- *waste lubricating oil with or without polychlorinated biphenyl (PCB)*

An evaluation of disposal/disposition alternatives for each of the 20 waste samples and their source material was generated using analytical data and State and Federal regulatory guidelines. In addition, persons at two active Montana mines, a waste oil processor, a hazardous waste shipping contractor and a chemical manufacturer were contacted to ascertain if their businesses would accept waste materials from the site (Appendix C).

3.0 RESULTS AND DISCUSSION

This chapter presents a discussion of investigatory results obtained from waste material sampling at the Nellie Grant Mine. Included below are sections addressing the possible identification of waste materials and alternatives for disposal/disposition of the waste materials.

3.1 WASTE MATERIAL IDENTIFICATION

Pertinent information about each waste material sample is presented on Table 1. This information was derived from physical observations and approximate volume measurements of the source waste material during sampling activities and from laboratory analytical results. Laboratory reports contained in Appendix B for each sample summarize the results of each analysis. The laboratory reports also list the EPA maximum concentrations for non-hazardous waste.

Table 1 indicates that there are at least five possible source "products" represented by the 20 waste material samples. These possible source products include:

1. Methyl Isobutyl Carbinol - samples 1 and 11
2. Sodium Isopropyl Xanthate - samples 5, 6, 7, 8, 9, and 10
3. Waste Oil - samples 13 and G
4. Sodium Silicate Anhydrous - samples A and F
5. Waste Oil in soil material - samples H and I

Analytical results from samples 2, 3, 4, 12, B and C did not reveal a possible source product. In particular, the product labels on sample containers 4 and 12 did not match expected analytical results. Sample container 4 was labelled Aerofloat 340 Promoter which is dithiophosphate-based material (Appendix A). Analytical tests on sample 4 for total phosphorous indicated less that 4% phosphorous which apparently precludes sample 4 as

Table 1
Waste Material Characteristics, Nellie Grant Mine
Jefferson County, Montana

			Hazardous Waste Characteristics						
Sample No. Location	Type	Material Volume	TOX	IGN	REA	COR	PCB	Possible Material Identification	Disposal/Disposition Alternatives
1 mill building	L	≈ 10 gal		X			–	Methyl Isobutyl Carbinol (93%)	Reuse at operating mine or RCRA TSD
2 mill building	L	≈ 35 gal	X Lead			X	–	?	RCRA TSD
3 mill building	L	≈ 35 gal		X	X	X	–	?	RCRA TSD
4 mill building	L	≈ 35 gal	X Lead				–	?	RCRA TSD
5 mill building	S	55 gal			X		–	Sodium Isopropyl Xanthate	Reuse at operating mine or disposal at RCRA TSD
6 mill building	S	55 gal			X		–	Sodium Isopropyl Xanthate	Reuse at Operating mine or disposal at RCRA TSD
7 mill building	S	55 gal			X		–	Sodium Isopropyl Xanthate	Reuse at Operating mine or disposal at RCRA TSD
8 mill building	S	55 gal			X		–	Sodium Isopropyl Xanthate	Reuse at Operating mine or disposal at RCRA TSD
9 mill building	S	17 gal			X		–	Sodium Isopropyl Xanthate	Reuse at Operating mine or disposal at RCRA TSD
10 mill building	S	55 gal			X		–	Sodium Isopropyl Xanthate	Reuse at Operating mine or disposal at RCRA TSD
11 mill building	L	50 gal		X			–	Methyl Isobutyl Carbinol (100%)	Reuse at operating mine or RCRA TSD
12(1) mill building	L	≈ 30 gal					–	?	RCRA TSD
13 Generator Bld	L	≈ 20 gal					ND	Waste oil with Halogens & lead	Waste oil processor
A mill building	S	14 sacks					–	Sodium Sulfite Anhydrous	Reuse at operating mine or landfill
B(1) mill building	L	1/2 - 1 gal					–	?	RCRA TSD
C mill building	L	1/2 - 1 gal	X Lead			X	–	?	RCRA TSD
F mill building	S	≈ 0.1 yd^3					–	Sodium Sulfite Anhydrous	Disposal at landfill
G Generator Bld	L	≈ 120 gal					ND	Waste oil with halogens	Waste oil processor
H Generator Bld	D	1-2 yd^3	–	–	–	–	ND	Waste oil in soil	Landfarm
1 shop	D	1-2 yd^3	–	–	–	–	ND	Waste oil in soil	Landfarm

*Key to Table 1 on following page

KEY TO TABLE 1

Samples collected on August 9-10, 1990

Location: Refer to Figures 1, 2, and 3

Type: L = Liquid, S = Solid, D = Soil

Hazardous Waste Characteristics

TOX	Toxicity - TCLP metals and Methyl Ethyl Ketone
IGN	Ignitability - Flash point less than 140° F
REA	Reactivity as Cyanide and/or Sulfide
COR	Corrosivity pH less than 2.0 or more than 12.5
PCB	Polychlorinated Biphenyls

RCRA TSD Facility permitted by the Resource Conservation and Recovery Act as a hazardous waste Treatment, Storage or Disposal facility.

– Not analyzed

ND Not detected above detection limit

Refer to Appendix B for complete laboratory reports for each sample

(1) Laboratory holding time for volatile organics exceeded

containing Aerofloat 340 Promoter (Appendix B). Sample container 12 was labelled Superfloc 330 which contains amines (nitrogen compounds) (Appendix A). The analytical test for total Kjeldahl nitrogen (Appendix B) indicated less than 5% nitrogen which apparently prevents sample 12 as being Superfloc 330.

Samples 13, G, H and I were preliminarily identified during the reconnaissance visit as consisting of waste oil. Samples 13 and G were liquid samples and were analyzed for several parameters including hazardous waste characteristics, MIC and PCBs (Appendix B). Samples G and 13 did not exhibit the characteristics of a hazardous waste but did exceed the 5 milligram per kilogram (mg/kg) allowable limit for lead in a reusable waste oil. PCBs were not detected in either sample 13 or G.

Samples H and I were apparently waste oil in a soil matrix. Total recoverable petroleum hydrocarbons in samples H and I were 64,000 mg/kg and 50,500 mg/kg, respectively. PCBs were not detected in either sample.

Of the 20 waste material samples, 12 exhibited the characteristics of a hazardous waste (Table 1). Three samples exhibited the toxicity characteristic. Lead was the only parameter that exceeded the toxicity regulatory level (Appendix B). In addition, three samples exhibited the characteristic of ignitability, seven samples were reactive and 3 samples were corrosive (Table 1). Although 12 samples tested positive as hazardous waste, it is possible that several sample sources could be considered product and be eligible for use in an active mining operation.

3.2 DISPOSAL/DISPOSITION ALTERNATIVES

The results of our investigation indicate there are viable options for both disposal and reuse of waste materials ate the site. These alternatives include:

- Disposal at a sanitary landfill;
- Disposal at a RCRA-permitted treatment, storage or disposal (TSD) facility;
- Reuse at an active mining operation;
- Processing at a waste oil treatment facility; and
- Landfarming oily soil.

Table 1 presents alternatives for disposal/disposition for each sample source.

4.0 CONCLUSIONS AND RECOMMENDATIONS

It is our opinion that the 20 waste source materials identified during our investigation at the Nellie Grant Mine can be safely and legally accommodated prior to proceeding with mine reclamation activities. Ideally, waste materials identified at that could be considered "product" should be reused. The unidentified (unknown) waste materials at the site should be transported to a RCRA TSD facility.

Table 2 provides our specific recommendations for the ultimate disposition of the waste materials identified during our investigation. The following describes our rational for making these recommendations.

- Samples 1 and 11 are probably methyl isobutyl carbinol. Montana Tunnels Mine uses this chemical in their mill processes and is willing to accept the material (Appendix C).

- Samples 5, 6, 7, 8, 9 and 10 are probably sodium isopropyl xanthate. Montana Resources Inc., uses this material and will accept it for use in their mining operation. (Appendix C).

- Samples 13 and G are apparently waste oil. Montana Oil Processing will accept the oil for reprocessing and are available to transport the oil from the site to their facility (Appendix C).

- Samples A and F are probably sodium sulfite anhydrous. Because the material is non-hazardous, we feel it can be disposed of in a sanitary landfill. We recommend notifying a particular landfill of the material prior to disposal.

TABLE 2

Recommended Waste Material Disposal/Disposition Alternatives
Nellie Grant Mine, Jefferson County, Montana

Possible Material Identification	Sample Numbers	Approximate Volume	Recommended Disposition
Methyl Isobutyl Carbinol	1 and 11	60 ± gallons	Reuse at Montana Tunnels Mine
Sodium Isopropyl Xanthate	5, 6, 7, 8, 9 and 10	292 ± gallons	Reuse at Montana Resources Inc. Mine
Waste Oil	13 and G	120 ± gallons	Processing at Montana Oily Waste Processors
Anhydrous Sodium Sulfite	A and F	14 ± sacks	Disposal at a Sanitary Landfill
Waste Oil in Soil	H and I	2 to 4 ± cubic yards	Landfarm
Unknown	2, 3, 4, 12, B and C	137 ± gallons	Disposal with Special Resources Management

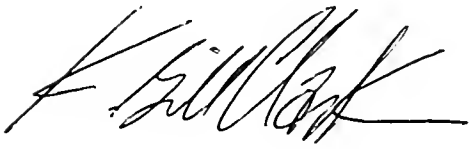
- Samples H and I are apparently waste oil in a soil matrix. We recommend excavating the oil-stained material at each sample location and landfarming the soil on-site to naturally degrade petroleum hydrocarbons.

- Samples 2, 3, 4, 12, B and C are unknown waste materials. Each of these samples except samples 12 and B exhibit the characteristics of a hazardous waste. Because our analytical tests did not provide positive identification of samples 12 and B and because samples 2, 3, 4 and C are classified as hazardous wastes, we recommend disposal at a RCRA TSD facility. Special Resources Management is available to arrange waste transport to a RCRA TSD facility.

5.0 LIMITATIONS

This work was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Chen-Northern observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Chen-Northern's findings and conclusions must not be considered as scientific certainties, but as opinions based on our professional judgement concerning the significance of the data gathered during the course of the monitoring.

Prepared by:



K. Bill Clark
Hydrogeologist

Reviewed by:

David Hazen
Geologic Engineer

6.0 REFERENCES

American Cyanamid, 1990. Personal communication between Ms. Pat Bond of American Cyanamid and K. Bill Clark.

Miller, K., 1990. Personal communication between Mr. Miller, former Sparrow Resources employee and currently employed by Chen-Northern Inc., Boise, Idaho, and K. Bill Clark.

Sampling for Hazardous Materials, 1987. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response Support Division, EPA Course 165.9; Course materials, Helena, Montana, August 18-20, 1987.

U.S. Environmental Protection Agency, 1990. Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Toxicity Characteristics Revisions. Federal Register, Vol. 55, No. 61, March 29, 1990.

APPENDIX A

SITE SAFETY PLAN

SITE SAFETY PLAN

NELLIE GRANT MINE, JEFFERSON COUNTY, MONTANA

DRUM/BARREL SAMPLING

A. GENERAL INFORMATION

Name of Facility:	Nellie Grant Mine
Location:	Approximately 13 miles southwest of Helena, Montana
CNI Project Manager:	K. Bill Clark, Helena, Montana
Client:	Montana Department of State Lands (DSL), Abandoned Mine Bureau
Contact:	Mr. Larry Marshall, 444-2074
Plan Prepared by:	K. Bill Clark - August 2, 1990
Reconnaissance Visit:	August 1, 1990 - K. Bill Clark
Background Information:	DSL files located at Robert Peccia and Associates, conversations with Kirk Miller, former Sparrow Resources employee -- overall incomplete site background information
Proposed Sampling Date:	August 8-10, 1990
Overall Hazard Summary:	Moderate

B. OBJECTIVES OF THIS SITE SAFETY PLAN

The objective of this site safety plan is to protect Chen-Northern personnel from health and safety hazards they might experience in the performance of this task.

C. OBJECTIVES OF CHEN-NORTHERN PARTICIPATION

Chen-Northern's objectives are to:

- collect representative samples from liquid and solid wastes stored in thirteen 55-gallon drums and up to four 5-gallon containers stored at the site;
- submit the samples to an analytical laboratory for testing of hazardous waste characteristics and substance identification; and
- recommend disposal alternatives to DSL.

D. SITE CHARACTERISTICS

Attachment A contains a site vicinity map, site map and a detail map of the drum storage area. Attachment B contains a table, referenced to the detail map, describing each waste container at the drum storage area.

A video tape was prepared during an August 1, 1990 site reconnaissance which shows the site layout and drum storage area. The wind direction during the morning of August 1 was from the east, upslope.

1. Site History

- The mine was first staked in the 1880's. Mining has occurred sporadically until about 1980. Minerals recovered were primarily lead and silver.

- Sparrow Resources, Ltd. was the last mining operation at the site. They used a portable crusher and mill to extract minerals. The mill was a flotation mill and used chemical floatation agents to recover minerals.

- According to Mr. Kirk Miller, the floatation agents included methyl ethyl ketone (MEK) or methyl ethyl carbinol, and xanthate compounds. Mr. Miller does not think that cyanide was used at the mill because gold concentrations were low to non-existent.

2. Site Description

- The project site consists of a mine entrance with a head frame, a tailings dump area, leach piles, and several buildings including cabins, a shop/office building, storage buildings, and a mill/crusher building (Attachment A).

- A 55-gallon steel drum is located at the front (south side) of the shop/office building (Attachments A and B). The top bung is open and the barrel is full of a dark liquid, presumably waste oil from two diesel generators. The ends of the barrel are bulged which probably indicates that some water is in the barrel.

- The drum storage area is located on the southeast side of the mill/crusher building (Attachment A). The drums are located in an approximately 15 foot by 15 foot addition to the main building. The addition is open to the east, has a dirt floor and has a door on the north wall open to the former mill.

- A road encircles the mill/crusher building (Attachment A). A relatively flat area is located on the north side of the building adjacent to the mine access road.

- A surface drainage, discharging approximately one to five gallons per minute, flows along the south side of the mill/crusher building.

- Fifteen 55-gallon metal barrels (three empty with open tops), 14 sacks of a white chemical solid, and two 5-gallon containers (one appears empty) are stored in the addition to the mill/crusher building (Attachments A and B). Two 5-gallon plastic containers are located in front (east) of the addition; one upright and one on its side. A white powder spill is located on the dirt floor adjacent to the 14 chemical sacks.

3. Utilities

- There is no evidence of "live" utilities at the site. Electric utility wires have been dismantled from power poles and cut. The two diesel engine units in the shop/office building probably supplied mine power needs.

4. Topography

- The project site is located on an east-northeast facing slope at an elevation of about 6,850 feet above mean sea level. The area south and west of the mill/crusher building slopes up and the area east of the building slopes down (Attachment A).

5. Liquid and Solid Wastes Present

- Figures contained in Attachment A and the table contained in Attachment B should be reference for the following discussion.

- Although some of the barrels and containers are labelled, there is no assurance that the contents agree with the label.

a. Labelled Solid Wastes

- The 14 sacks on a shelf in the addition to the mill/crusher building, of which at least 8 are broken, are labeled *sodium sulfite anhydrous*. The white powder spilled adjacent to the sacks is possibly from these sacks, or former sacks.

- Six metal 55-gallon barrels (ID Nos. 5 through 10, Attachments A and B) are staged on the north side of the addition building. They have snap ring tops and are similar in appearance. This top configuration probably indicates that a solid material is stored in the barrels. At least one of the barrels is labelled *sodium isopropyl xanthate*. Barrel No. 10 has what appears to be two bullet holes in it. A white powder is visible through the holes.

b. Labelled Liquid Wastes

- The 5-gallon metal container No. E is labelled *sodium silicate solution.* The container is apparently empty.

- Barrel No. 4 is labelled *Aerofloat 340 promoter, American Cyanamid.* Barrel No. 3 is similar in appearance to barrel No. 4 (paint color scheme) and has a un-readable label caused by spillage and weathering.

- Barrel No. 12 has a partially readable label which apparently reads *Superfloc 330, American Cyanamid.* The top on this barrel is ripped open ≈25% and a dark liquid was observed. A hand-written date of 6-13-79 is located on the top portion of the barrel.

c. Un-labelled Liquid Wastes

- Five-gallon plastic container No. B has an un-readable label and containers Nos. C and D are un-labelled. Mr. Miller recalls that either *methyl ethyl ketone* or *methyl isobutyl carbinol* used at the mine arrived in 5-gallon containers. It is may be possible that containers Nos. B, C and D contain these chemicals.

- Barrels Nos. 1 and 2 are un-labelled.

- Barrel No. 11 is un-labelled.

- Barrel No. 13, located at the shop/office building, is un-labelled but may possibly contain *waste oil* and water.

d. Summary of Suspected Wastes at the Site

- *sodium sulfite anhydrous*
- *sodium isopropyl xanthate*
- *sodium silicate solution*
- *Aerofloat 340 promoter*
- *Superfloc 330*
- *methyl ethyl ketone*
- *methyl isobutyl carbinol*
- *waste oil*

E. HAZARD CHARACTERISTICS

Hazard characteristics for the suspected chemicals present at the Nellie Grant Mine are contained in Attachment C.

F. RISK ASSESSMENT

The liquid and solid wastes to be sampled at the Nellie Grant Mine should present a moderate hazard to sampling personnel. This is based on the limited information obtained in the site reconnaissance and site review, and is based only on identified hazards.

The identified hazards to sampling personnel are inhalation of organic vapors and dusts, and eye and skin irritation. These hazards can be mitigated or controlled using personal protective equipment. This equipment will include full-face air purifying respirators (APR) and splash-protective suits and gloves. Sampling personnel will use a combination acid gas/organic vapor respirator cartridge. Non-sparking tools to open containers will be used to prevent the possibility of explosion. A fire extinguisher will be available at the Hot Line outside the drum storage building.

The expected wind direction is westerly (upslope) and into the open end of the drum storage building. Because the building will be well ventilated and because of the nature of the chemicals, the use of self contained breathing apparatuses (SCBA) may be unnecessary. However, an SCBA will be on-site and ready for use by the back-up sampler during all sampling activities.

G. SITE PROCEDURES

1. Sampling Team Organization

PERSONNEL	ASSIGNMENT
K. Bill Clark	
Dave Hazen	

2. Site Entry Procedures

- Notify DSL and Robert Peccia and Associates personnel prior to the sampling event
- Cordon off the "Hot Zone" in front (east) of the drum storage building using marker tape
- Cordon off the "Decontamination Zone" and "Clean Zone"
- Don protective gear and assemble the decontamination pad in the order most practical for site conditions.
- Assemble all sampling equipment including air monitoring equipment at the entry point to the "Hot Zone"

3. Safety Procedures

- Don protective gear in a manner to maximize skin protection from drips, spills and casual contacted with the liquid and solid wastes
- Protective gear should include from inside out: inner clothes, inner latex gloves, full face piece, hooded splash-resistant tyvex suit, safety boots, boot covers and outer chemical resistant gloves
- Have paper towels and/or absorbent pads available for wiping excess liquids from equipment and protective clothing
- Use plastic tarps/sheeting to cover barrel tops, sides and building floor
- The decontamination procedure should follow the process contained in Attachment D

4. Equipment List

plastic tarps
paper towel
absorbent pads
sample containers
plastic aprons
hooded tyvex suits
natural rubber gloves
rubber outer gloves
fire extinguisher
first aid kit
full face mask
drum thief
plastic bags
escape pack
organic vapor/acids gas filter cartridges
tap water
decon tubs
brushes
sprayers
brass bung wrench
shovel
nitrile gloves
boot covers
eye wash station
air monitoring equipment
SCBA
plastic trowels
video camera

5. Air Monitoring

- Use air monitoring equipment to monitor atmosphere in drum storage building. If organic vapors are present in excess of **100 ppm**, stop work, don SCBA and continue sample collection.
- Monitor vapor concentrations during collection of each sample.
- If vapor concentrations exceed **500 ppm** stop work until concentrations are reduced.

6. Standard Operating Procedure

Survey atmosphere in building to determine if vapor/explosive hazard is present. Record data and determine if correct protective equipment is being used.

a. Liquids

- Place tarp over drum or container and cut hole over bung/spout. Open bung using the bung wrench. Place labelled sample container(s) on tarp.
- Insert drum thief and determine if solids are present. If not, reinsert thief, cover top and remove to determine how full drum is. Record this information.
- Reinsert thief into drum, cover top and remove. Allow excess liquid to drain off thief into drum, then begin to fill sample container(s). Repeat process until container(s) is full.
- Dispose of thief in drum and close bung/spout.
- Pick up tarp and proceed to decon pad. Dispose of tarp and outer gloves (if they can't be decontaminated) in a plastic garbage bag. Don new outer gloves.
- Repeat process for each drum/container.

b. Solids

- Open snap ring cover on drum. Place lid on plastic tarp on ground. Cover lid with plastic tarp and place labelled sample containers on tarp.
- Observe consistency of solid and fullness of container.
- Collect representative sample of solid with disposable trowel or stainless steel trowel/spoon.
- Pick up tarp and proceed to decon pad. Dispose of tarp and outer gloves in plastic garbage bag. Don new outer gloves.
- Repeat process for each drum/container.

7. Decontamination

Discard plastic tarps, outer gloves and other contaminated protective equipment after sampling each container/drum.

8. Site Exit Procedures

Disassemble gear and markers.

H. EMPLOYEE TRAINING REQUIREMENTS

At the time of job assignment, all employees assigned to the project shall receive a minimum of 40 hours of safety training.

I. MEDICAL SURVEILLANCE

Medical surveillance for employees will be in accordance with the Chen-Northern written medical surveillance plan.

J. EMERGENCY INFORMATION

Emergency Contacts

- Dr. Maher - phone 442-3570
- Poison Control Center - phone 1-800-525-5042

What to Report

State "This is an Emergency"
Your name and association
Telephone number to reach you
Your location
Name of person injured or exposed
Nature of emergency
Actions taken

Route to Hospital

Route to St. Peter's Community Hospital marked on map in Attachment A

First Aid/Safety Equipment

An eye wash station, first aid kit and fire extinguisher will be located at the drum location.

K. SAFETY PLAN APPROVAL

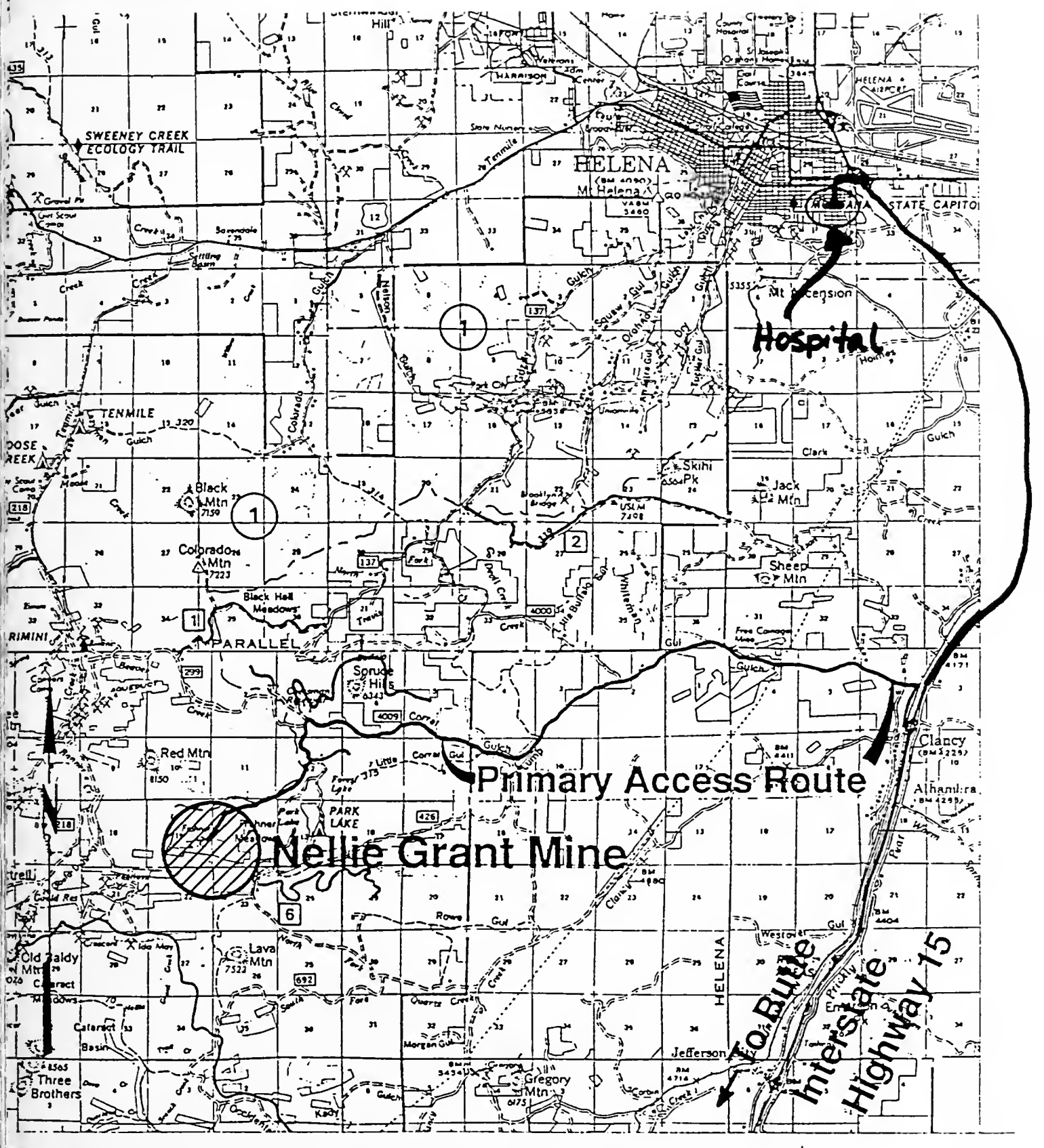
This safety plan was written for the use of Chen-Northern personnel performing sampling activities at the Nellie Grant Mine site, Jefferson County, Montana. This plan was written for specific site conditions, work tasks, dates and personnel specified and must be amended if conditions change.

PLAN REVIEWED BY:_____DATE:_____
PLAN REVIEWED BY:_____DATE:_____

PLAN APPROVED BY:
CHEN-NORTHERN INDUSTRIAL HYGIENIST_____DATE:____
CHEN-NORTHERN PROJECT MANAGER _____DATE:____
CHEN-NORTHERN DIVISION MANAGER _____DATE:____

ATTACHMENT A

SITE MAPS



Nellie Grant Mine Reclamation Project

General Project Area Map

(from Helena National Forest Visitors Map)

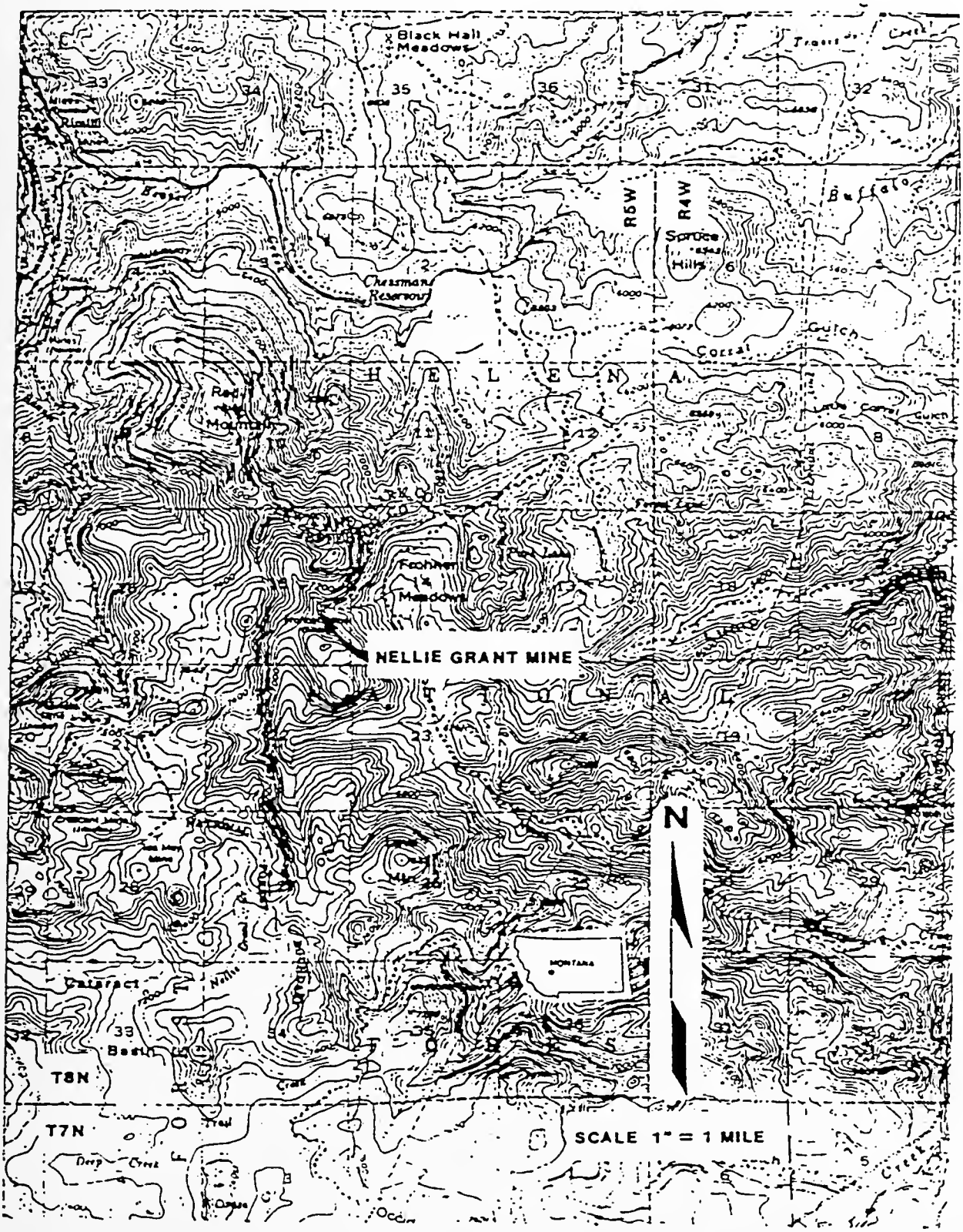
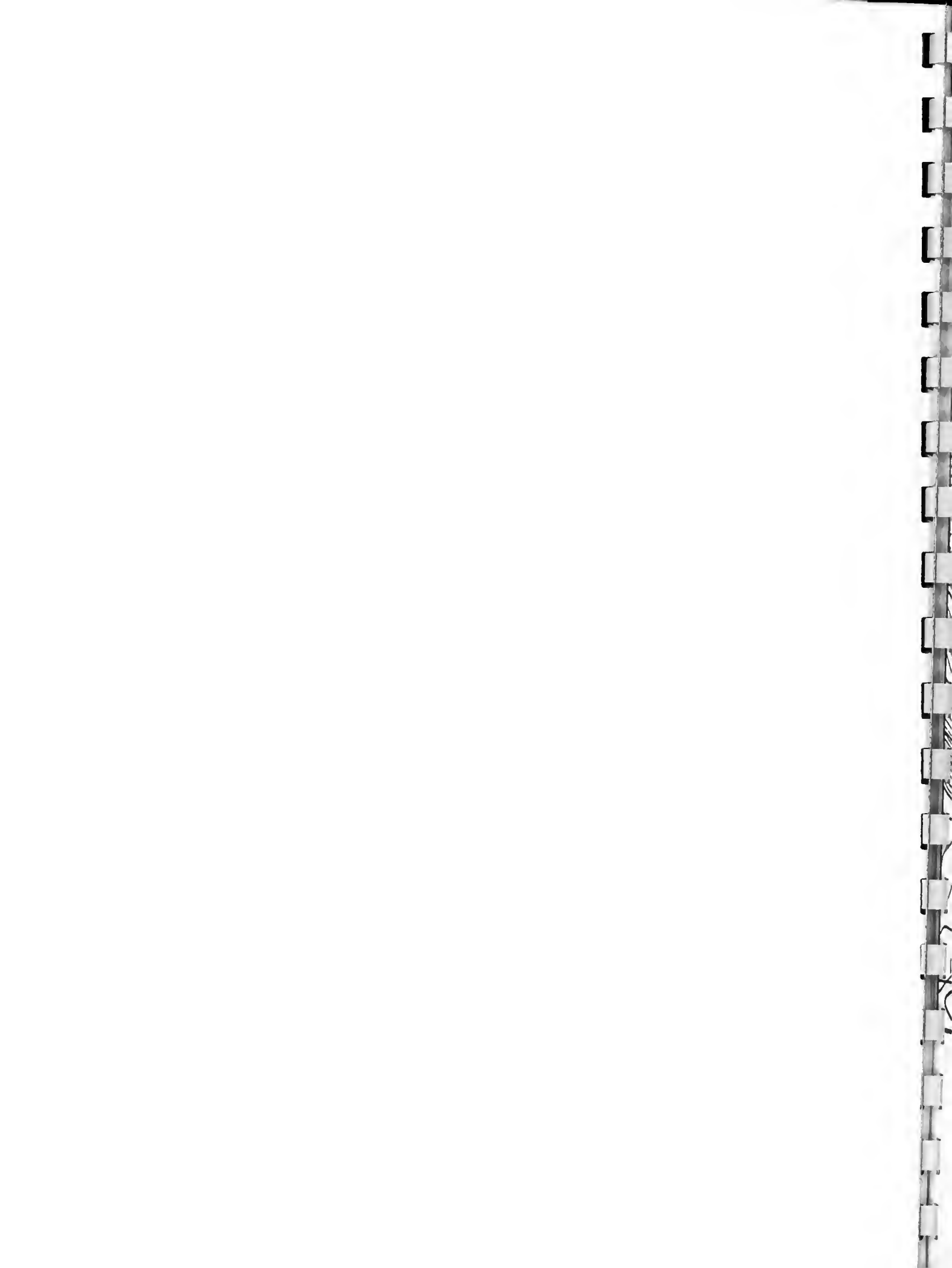


FIGURE 1 NELLIE GRANT MINE



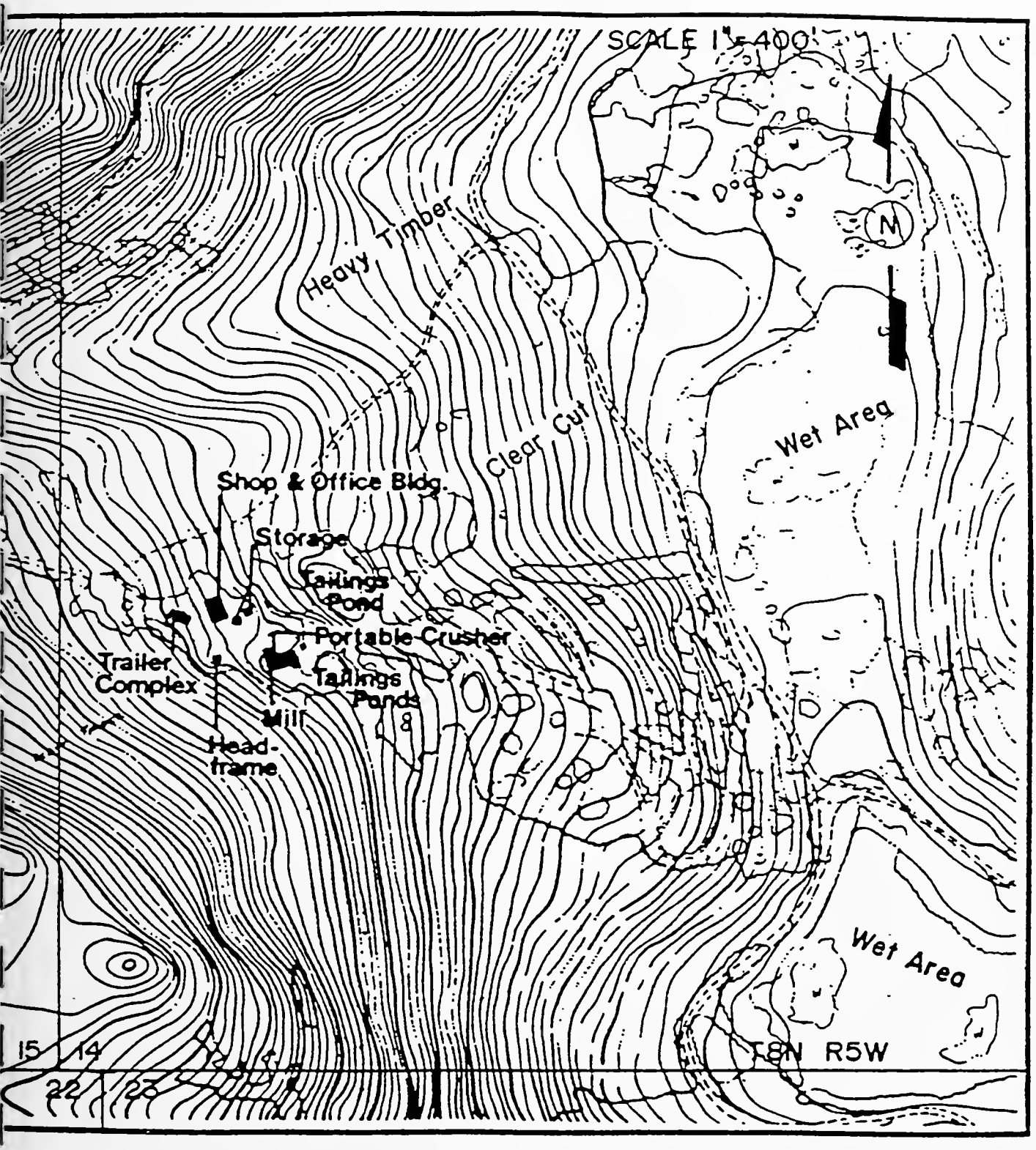
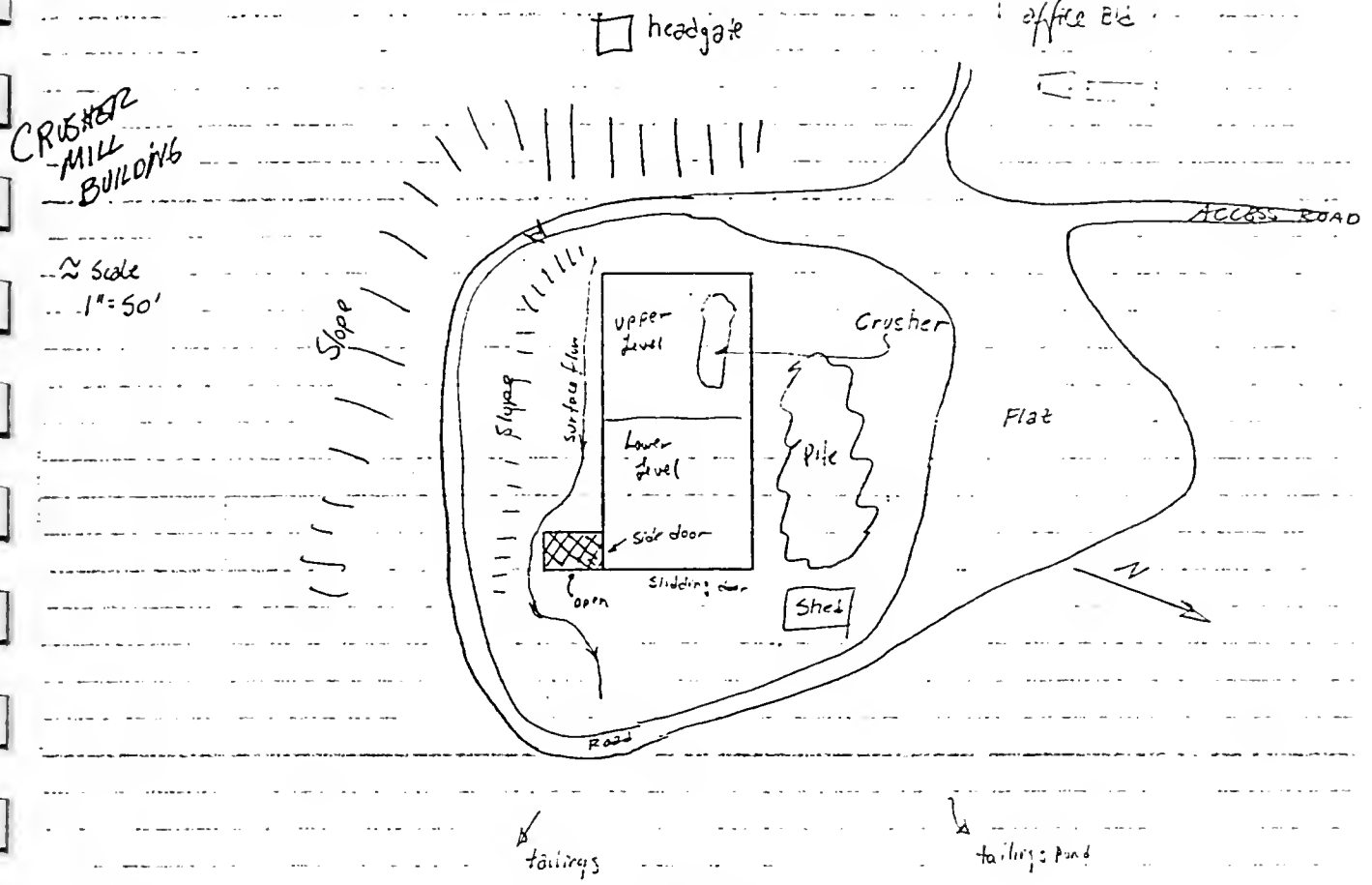


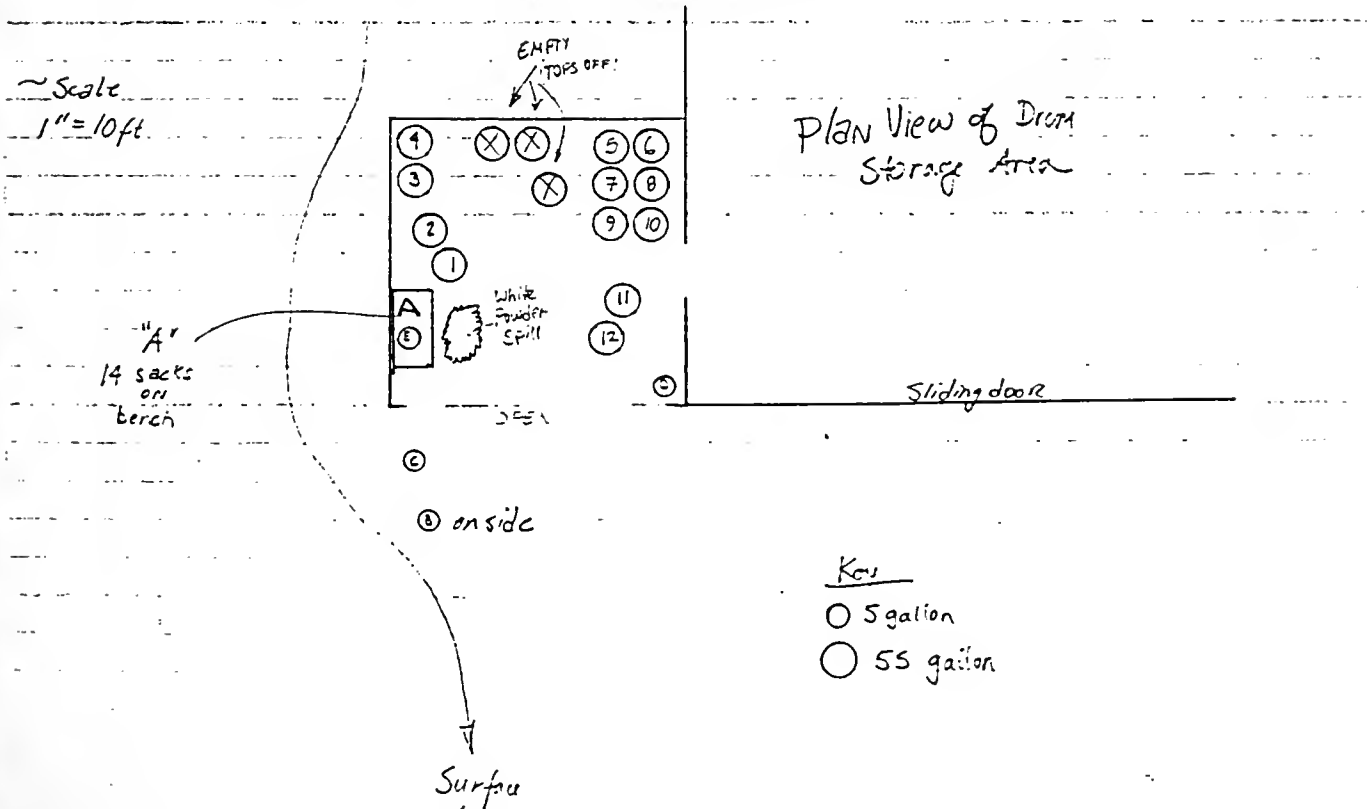
FIGURE 3 SURFACE FACILITIES

Chen Northern, Inc.
consulting engineers & scientists

JOB. NO. 90-3133.N JOB TITLE Nellie Grant Mine DATE 8-1-90 BY KW Clark

SUBJECT MAP OF DRUM STORAGE AREA CHECKED SHEET OF





ATTACHMENT B

TABLE OF WASTE/CONTAINER INFORMATION

ATTACHMENT B

WASTE/CONTAINER INFORMATION

Container Number	Container gallon/material	Top Type	Label	% Full	Remarks
A	sacks	–	Sodium Sulfite Anhydrous	at least 8 sacks broken	14 total sacks
B	5/plastic	pour spout	? corrosive	5-10%	
C	5/plastic	pour spout	–	5%	no label
D	5/plastic	pour spout	–	50%	no label
E	5/metal	cap	Sodium Silicate Solution	0-1% ?	appears empty
1	55/metal	bung	–	?	no label
2	55/metal	bung	–	?	no label
3	55/metal	bung	?Aerofloat	?	barrel color like #4
4	55/metal	bung	Aerofloat 340 Promoter	?	American Cyanamid Label
5	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
6	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
7	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
8	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
9	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
10	55/metal	snap ring	Sodium Isopropyl Xanthate	?	
11	55/metal	bung	–	100%	no label
12	55/metal	bung	Superfloc 330	50%	top open, date 6-13-79
13	55/metal	bung	–	100%	barrel ends bulged

ATTACHMENT C

HAZARD CHARACTERISTICS

ATTACHMENT C

HAZARD CHARACTERISTICS

Chemical	TLV	IDLH	LEL	OT	FP	First Symptom of over Exposure	Chronic Effects/ Other
Sodium Sulfite Anhydrous	--	--	--	--	--	--	addition of water could cause reaction
Sodium Isopropyl Xanthate	400	--	1.25	--	--	respiratory, eye and dermal irritation	depress CNS, headache, can decompose to carbon disulfide
Sodium Silicate Solution	--	--	--	--	--	--	--
Aerofloat 340 Promoter	--	--	--	--	>200	burns eyes and skin	Use respiratory protection, splash gear, sulfur dioxide may form
Superfloc 330	--	--	--	--	>200	--	if heated will produce various oxides, slippery
Methyl Ethyl Ketone	200	3,000	2.0	10	21	irritation to eyes, nose and throat	CNS and respiratory damage, mint odor
Methyl Isobutyl Carbinol	25	2,000	1.0	--	106	irritation to eyes and skin, headache	eye and skin damage, mild odor

KEY

TLV Threshold Limit Value, ppm, 8-hour time-weighted average
IDLH Immediately Dangerous to Life and Health, ppm
LEL Lower Explosive Limit, %
OT Odor Threshold, ppm
FP Flash Point, °F
CNS Central Nervous System
-- Unknown

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 7

To Jerry Bowser	From K A Smith
Co. CNJ	Co. CNJ - Chem
Dept.	Phone #
Fax #	Fax #

CYANAMID

MATERIAL SAFETY DATA

PRODUCT IDENTIFICATION

TRADE NAME:	AERO® 343 Xanthate
SYNONYMS:	Sodium isopropyl xanthate
CHEMICAL FAMILY:	Alkyl xanthate salt
MOLECULAR FORMULA:	(CH3)2CHOC(S)SNa
MOLECULAR WGT.:	158.2

WARNING

WARNING! HARMFUL IF ABSORBED THROUGH SKIN
DUST IRRITATING
CAUSES EYE AND SKIN IRRITATION

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Sodium hydroxide	001310-73-2	1.5	2mg/M3 (ceiling)	OSHA/ACGIH
Isopropanol	000067-63-0	~0.5-1.0	400 ppm 500 ppm STEL	OSHA/ACGIH
Sodium sulfide	001313-82-2	~1	not established	

NFPA HAZARD RATING

Fire 1
Health 2 1 Reactivity
Special

FIRE: Material that must be preheated before ignition can occur.
HEALTH: Materials which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.
REACTIVITY: Materials which in themselves are normally stable, but which can become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently.

HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE: The acute oral (rat) LD50 value for this material is calculated to be 569 mg/kg. The dermal (rabbit) LD50 value is between 400 and 1000 mg/kg. Skin or eye contact with solutions of this product may cause moderate eye and skin irritation. Airborne dust may cause significant eye, skin, or respiratory tract irritation.
Carbon disulfide may be released as a trace contaminant or as a decomposition product of xanthates. Overexposure to carbon disulfide may produce eye, skin and respiratory tract irritation, skin sensitization, dizziness, headache, degeneration of peripheral nerves, manic depressive psychosis and cardiovascular disorders.

Toxicology information on regulated components of this product is as follows:

EMERGENCY PHONE: 201/835-3100

AMERICAN CYANAMID COMPANY, 1 CYANAMID PLAZA, WAYNE, NEW JERSEY 07470

AERO® 343 Xanthate

Acute overexposure to sodium hydroxide mists or dusts causes severe respiratory irritation. A solution of sodium hydroxide can produce irreversible damage to eyes and skin.
Acute overexposure to isopropanol vapor may cause some irritation of the eyes and respiratory system. Repeated or prolonged overexposure to isopropanol vapor may cause central nervous system depression, resulting in headache, dizziness, nausea and staggered gait. The liquid isopropanol is a moderate eye irritant. The oral (rat) and dermal (rabbit) LD50 values for isopropanol are 4.7-5.8 g/kg and 12.8 g/kg, respectively. The LC50 after a four hour exposure to rats is greater than 12,000 ppm.
Sodium sulfide irritates skin and mucous membranes. This material liberates hydrogen sulfide upon contact with acids.

RST AID:

In case of skin contact, remove contaminated clothing without delay. Flush skin thoroughly with water. Do not reuse clothing without laundering.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes. Obtain medical attention if irritation persists.

XPOSURE ONTROL METHODS

Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands with soap and water. Avoid skin contact. Protective clothing such as impervious gloves, apron, workpants, long sleeve work shirt, or disposable coveralls are recommended to prevent skin contact. For operations where eye or face contact can occur, wear eye protection such as chemical splash proof goggles or face shield. Eyewash equipment and safety shower should be provided in areas of potential exposure. Where exposures are below the Permissible Exposure Limit (PEL), no respiratory protection is required. Where exposures exceed the PEL, use respirator approved by NIOSH for the material and level of exposure. See "GUIDE TO INDUSTRIAL RESPIRATORY PROTECTION" (NIOSH).

RE AND XPLOSION AZARD FORMATION		
	FLASH POINT:	Not Applicable
	FLAMMABLE LIMITS (% BY VOL):	Lower - 1.25; Upper - 50.0 (values for carbon disulfide)
	AUTOIGNITION TEMP:	248 F (120 C) (value for carbon disulfide)
	DECOMPOSITION TEMP:	428-464 F(220-240 C)
	FIRE FIGHTING:	Use carbon dioxide, dry chemical or large quantities of water to extinguish fires. Heat causes decomposition to vapor of carbon disulfide. Wear self-contained, positive pressure breathing apparatus and full firefighting protective clothing. Solid xanthates are stable when kept cool and dry. However, exposure to heat and moisture can cause decomposition to flammable and explosive vapor of carbon disulfide. Since xanthates decompose in solution, even at room temperature, fire and explosion hazards can develop with aging. The moisture precautions do not apply to the product when diluted according to the Cyanamid Product Bulletin.
ACTIVITY DATA	STABILITY:	Unstable
	CONDITIONS TO AVOID:	Exposure of the solid xanthate to heat or moisture and heating or aging of xanthate solutions.
	POLYMERIZATION:	Will Not Occur
	CONDITIONS TO AVOID:	None known
	INCOMPATIBLE MATERIALS:	Strong acids, oxidizing agents, moisture.
	HAZARDOUS DECOMPOSITION PRODUCTS:	Heat or moisture will liberate carbon disulfide. Thermal decomposition may produce carbon monoxide, carbon dioxide, sulfur oxides and/or carbon disulfide.
HYSICAL ROPERTIES	APPEARANCE AND ODOR:	Yellow pellets or powder; slight disagreeable odor
	BOILING POINT:	Not Applicable
	MELTING POINT:	451-462 F(233-239 C)
	VAPOR PRESSURE:	Not Applicable
	SPECIFIC GRAVITY:	Not Available
	VAPOR DENSITY:	Not Applicable
	% VOLATILE (BY VOL):	~1.5
	OCTANOL/H_2O PARTITION COEF.:	Not Applicable
	pH:	Not Applicable
	SATURATION IN AIR (BY VOL):	Not Applicable
	EVAPORATION RATE:	Not Applicable
	SOLUBILITY IN WATER:	Appreciable

AERO® 343 Xanthate

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Where exposure level is not known, wear NIOSH approved, positive pressure, self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. Wear same protective clothing/equipment as in Exposure Control Methods. Sweep up spills and place in a waste disposal container. Flush area with water.

WASTE DISPOSAL

Disposal must be made in accordance with applicable governmental regulations.

SPECIAL PRECAUTIONS

HANDLING AND STORAGE/OTHER: Heating or overexposure to moisture of solid xanthates or heating or aging of xanthate solutions causes some decomposition to poisonous and flammable carbon disulfide. Maintain good housekeeping to control dust accumulations. Special precautions against fire and explosion must be observed in (1) pumping xanthate solutions, (2) draining mobile tanks, (3) cleaning mobile tanks, and (4) performing maintenance work on storage tanks and pipelines leading to and from tanks. Storage tanks should have certain design features for maximum safety, and the vapor space should be free of sources of ignition. Use nonsparking tools and do not smoke when opening drums of xanthate. Do not use xanthate products until you have read the "Safety Discussion" in the AERO Xanthate Handbook from this Company.

D.O.T. SHIPPING FORMATION

PROPER SHIPPING NAME:	NOT APPLICABLE/NOT REGULATED
HAZARD CLASS:	NOT APPLICABLE
UN/NA:	NOT APPLICABLE
D.O.T. HAZARDOUS SUBSTANCES:	(Reportable Quantity of Product) NOT APPLICABLE
D.O.T. LABEL REQUIRED:	NOT APPLICABLE

TSCA FORMATION

This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

ENVIRONMENTAL FORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

			SARA TITLE III				
COMPONENT	CAS. NO.	%	TPQ (lbs.)	RQ (lbs.)	S313	RCRA	TSCA 12B
Sodium hydroxide	001310 73 2	1.5	NONE	1000	YES	NONE	NO

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA

ACUTE (Y)	CHRONIC (N)	FIRE (N)	REACTIVE (Y)	PRESSURE (N)

Marvin A. Friedman. Ph.D.-Director of Toxicology and Product Safety

CYANAMID

MATERIAL SAFETY DATA

MSDS NO. 1922-04
DATE: 05/04/89

PRODUCT IDENTIFICATION

TRADE NAME:	**SUPERFLOC® 330 Flocculant**
SYNONYMS:	Polyquaternary amine in water solution
CHEMICAL FAMILY:	Cationic polymer
MOLECULAR FORMULA:	Mixture
MOLECULAR WGT.:	Mixture

WARNING

IMPORTANT! SPILLS OF THIS PRODUCT ARE VERY SLIPPERY.

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
No Permissible Exposure Limits (PEL/TLV) have been established by OSHA or ACGIH.				

NFPA HAZARD RATING

Fire 1
Health 0 0 Reactivity
Special

FIRE: Material that must be preheated before ignition can occur.
HEALTH: Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.
REACTIVITY: Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE:	The acute oral (rat) LD50 for the active ingredient in this product is 5.0 ml/kg. Subchronic feeding studies in rats and dogs did not produce any significant adverse effects when the active ingredient of this product was evaluated at a dietary concentration of 1 or 4 percent.
FIRST AID:	No specific first aid procedures are necessary for accidental exposure to this product.

EMERGENCY PHONE: 201/835-3100

AMERICAN CYANAMID COMPANY, 1 CYANAMID PLAZA, WAYNE, NEW JERSEY 07470

PERFLOC® 330 Flocculant

EXPOSURE CONTROL METHODS

Engineering controls are not usually necessary if good hygiene practices are followed. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Avoid unnecessary skin contact. Impervious gloves are recommended to prevent prolonged skin contact. For operations where eye or face contact can occur, eye protection is recommended.

SUPERFLOC® 330 Flocculant

FIRE AND EXPLOSION HAZARD INFORMATION	FLASH POINT:	>200F (>93.3 C) Closed Cup
	FLAMMABLE LIMITS (% BY VOL):	Not Available
	AUTOIGNITION TEMP:	Not Available
	DECOMPOSITION TEMP:	Not Available
	FIRE FIGHTING:	Use water spray, carbon dioxide or dry chemical to extinguish fires. Use water to keep containers cool. Wear self-contained, positive pressure breathing apparatus.
REACTIVITY DATA	STABILITY:	Stable
	CONDITIONS TO AVOID:	None known
	POLYMERIZATION:	Will Not Occur
	CONDITIONS TO AVOID:	None known
	INCOMPATIBLE MATERIALS:	Strong oxidizing agents: this product corrodes iron, copper and aluminum.
	HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, ammonia, oxides of nitrogen and/or hydrogen chloride.
PHYSICAL PROPERTIES	APPEARANCE AND ODOR:	Amber liquid; slight, amine odor
	BOILING POINT:	Not Available
	MELTING POINT:	Freezing point: 0 F; - 18C
	VAPOR PRESSURE:	Not Available
	SPECIFIC GRAVITY:	1.08-1.18
	VAPOR DENSITY:	Not Available
	% VOLATILE (BY VOL):	~50 (water by weight)
	OCTANOL/H_2O PARTITION COEF.:	Not Available
	pH:	5 - 7
	SATURATION IN AIR (BY VOL):	Not Available
	EVAPORATION RATE:	Not Available
	SOLUBILITY IN WATER:	Complete

SUPERFLOC® 330 Flocculant

SPILL OR LEAK PROCEDURES	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:	Spills of this product are very slippery. Spilled material should be absorbed onto an inert material and scooped up. The area should be thoroughly flushed with water and scrubbed to remove residue. If slipperiness remains apply more dry-sweeping compound.
WASTE DISPOSAL	Disposal must be made in accordance with applicable governmental regulations.	
SPECIAL PRECAUTIONS	HANDLING AND STORAGE/OTHER:	NONE
D.O.T. SHIPPING INFORMATION	PROPER SHIPPING NAME:	NOT APPLICABLE/NOT REGULATED
	HAZARD CLASS:	NOT APPLICABLE
	UN/NA:	NOT APPLICABLE
	D.O.T. HAZARDOUS SUBSTANCES:	(Reportable Quantity of Product) NOT APPLICABLE
	D.O.T. LABEL REQUIRED:	NOT APPLICABLE
TSCA INFORMATION	This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.	

ENVIRONMENTAL INFORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

			SARA TITLE III				
COMPONENT	CAS. NO.	%	TPQ (lbs.)	RQ (lbs.)	S313	RCRA	TSCA 12B
This product does not contain any components regulated under these sections of the EPA							

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA

Not Applicable under SARA TITLE III

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Safety

CYANAMID

MATERIAL SAFETY DATA

MSDS NO. 0413-03
DATE: 03/08/89

PRODUCT IDENTIFICATION

PRODUCT NAME:	AERO® Promoter 3477 Aqueous
SYNONYMS:	None
CHEMICAL FAMILY:	Dithiophosphate
MOLECULAR FORMULA:	Mixture
MOLECULAR WGT.:	Mixture

WARNING

DANGER! CAUSES BURNS OF EYES AND SKIN

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Sodium hydroxide	001310-73-2	~ .5	2mg/M3 (ceiling)	OSHA/ACGIH

NFPA HAZARD RATING

Fire 1
Health 3 0 Reactivity
Special -

FIRE: Material that must be preheated before ignition can occur.
HEALTH: Materials which on short exposure could cause serious temporary or residual injury even though prompt medical treatment were given.
REACTIVITY: Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE:

Acute oral (rat) and acute dermal (rabbit) LD50 values for a similar product are 3.54 g/kg and 7.07 g/kg, respectively. Material was corrosive (skin) in rabbits.
Direct contact with this material may cause severe eye and skin irritation.
Contact with acid may cause liberation of hydrogen sulfide. Hydrogen sulfide has a strong rotten-egg odor, however, some people are unable to smell the gas and exposure will deaden the sense of smell. Therefore odor is an unreliable indicator of exposure. Overexposure to hydrogen sulfide gas may cause severe eye or respiratory tract irritation, rapid development of coma and respiratory failure. Low levels of hydrogen sulfide may cause headache, dizziness, staggering gait, neurological damage and gastritis.
Acute overexposure to sodium hydroxide mists or dusts causes severe respiratory irritation. A solution of sodium hydroxide can produce irreversible damage to eyes and skin.

FIRST AID:

In case of skin contact, remove contaminated clothing without delay. Wear impervious gloves. Cleanse skin thoroughly with soap and water. Do not omit cleaning hair or under fingernails if contaminated. Do not reuse clothing without laundering. Do not reuse contaminated leatherware.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes. Obtain medical attention without delay.

EXPOSURE CONTROL METHODS

Utilize a closed system process where feasible. Where this material

EMERGENCY PHONE: 201/835-3100

is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands with soap and water. Prevent eye and skin contact. For operations where eye or skin contact can occur wear the special protective equipment specified below. Prevent contamination of skin or clothing when removing protective equipment. Provide eyewash fountain and safety shower in close proximity to points of potential exposure. For operations where inhalation exposure can occur, a NIOSH approved respirator recommended by an industrial hygienist may be necessary. A full facepiece respirator also provides eye and face protection.
Special protective equipment - To prevent skin contact wear skin protection, such as impervious gloves, apron, workpants, long sleeve workshirt, or disposable coveralls. To prevent eye contact wear eye protection such as chemical splash proof goggles or face shield.

FIRE AND EXPLOSION HAZARD INFORMATION	FLASH POINT: METHOD:	>200 F (>93.3 C) Setaflash Closed Cup
	FLAMMABLE LIMITS (% BY VOL):	Not Available
	AUTOIGNITION TEMP:	Not Available
	DECOMPOSITION TEMP:	Not Available
	FIRE FIGHTING:	Use water, carbon dioxide or dry chemical to extinguish fires. Wear self-contained, positive-pressure breathing apparatus and full firefighting protective clothing. See Exposure Control Methods for special protective clothing. Sulfur dioxide or oxides of phosphorus may be formed under fire conditions. Do not flush to sewer which may contain acid. This could result in generation of toxic and explosive hydrogen sulfide gas.
REACTIVITY DATA	STABILITY: CONDITIONS TO AVOID:	Stable None known
	POLYMERIZATION: CONDITIONS TO AVOID:	Will Not Occur None known
	INCOMPATIBLE MATERIALS:	This product contains a neutralized dithioacid. Avoid contact with strong oxidizing agents and mineral acids.
	HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, hydrogen sulfide and/or oxides of sulfur and phosphorus.
PHYSICAL PROPERTIES	APPEARANCE AND ODOR:	Clear, pale yellow-dark amber, mobile liquid; noticeable odor
	BOILING POINT:	Not Available
	MELTING POINT:	<-5 F(<-20.6 C)
	VAPOR PRESSURE:	Similar to water
	SPECIFIC GRAVITY:	1.12 @ 25 C
	VAPOR DENSITY:	Similar to water
	% VOLATILE (BY VOL):	50 (water by weight)
	OCTANOL/H2O PARTITION COEF.:	Not Available

:ERO® Promoter 3477 Aqueous

pH:	11.0 minimum
SATURATION IN AIR (BY VOL):	Similar to water
EVAPORATION RATE:	Similar to water
SOLUBILITY IN WATER:	Complete

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Where exposure level is not known, wear NIOSH approved, positive pressure, self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Exposure Control Methods, wear rain suit. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush area with water.

VASTE DISPOSAL

Disposal must be made in accordance with applicable governmental regulations.

ECIAL ECAUTIONS

HANDLING AND STORAGE/OTHER: This product should not be mixed with acids since evolution of toxic and explosive hydrogen sulfide gas could result. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation.

).O.T. SHIPPING NFORMATION

PROPER SHIPPING NAME:	ALKALINE LIQUID, N.O.S.
HAZARD CLASS:	CORROSIVE MATERIAL
UN/NA:	NA1719
D.O.T. HAZARDOUS SUBSTANCES:	(Reportable Quantity of Product) NONE
D.O.T. LABEL REQUIRED:	Corrosive

CA NFORMATION

This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

VIRONMENTAL FORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

			SARA TITLE III				
COMPONENT	CAS. NO.	%	TPQ (lbs.)	RQ (lbs.)	S313	RCRA	TSCA 12B
Sodium hydroxide	001310-73-2	~ .5	NONE	1000	YES	NONE	NO

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA

ACUTE (Y)	CHRONIC (N)	FIRE (N)	REACTIVE (N)	PRESSURE (N)

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Safety

ATTACHMENT D

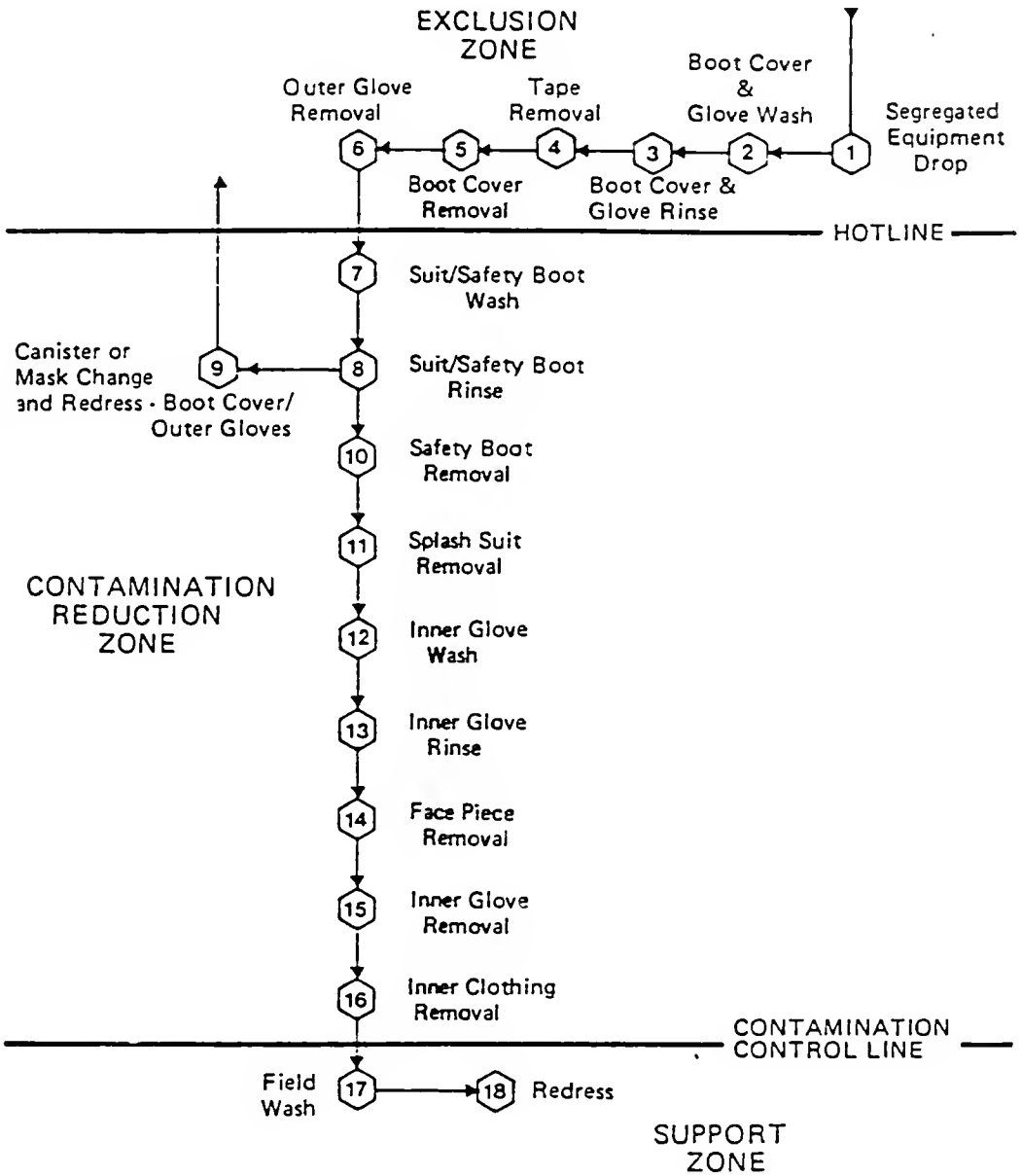
DECONTAMINATION PROCEDURE

S.O.P. No. 7

PROCESS DECON PROCEDURES

MAXIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



Source: OCTOBER 85 NIOSH/OSHA/USCG/EPA
Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities

FSOP 7: MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 1:	Segrated Equipment Drop	1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2:	Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decon solution or detergent and water.
Station 3:	Boot Cover and Glove Rinse	3. Rinse off decon solution from station 2 using copious amounts of water.
Station 4:	Tape Removal	4. Remove tape around boots and gloves and deposit in container with plastic liner.
Station 5:	Boot Cover Removal	5. Remove boot covers and deposit in containers with plastic liner.
Station 6:	Outer Glove Removal	6. Remove outer gloves and deposit in container with plastic liner.
Station 7:	Suit and Boot Wash	7. Wash splash suit, gloves, and safety boots. Scrub with long-handle scrub brush and decon solution.
Station 8:	Suit and Boot, and Glove Rinse	8. Rinse off decon solution using water. Repeat as many times as necessary.
Station 9:	Canister or Mask Change	9. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped worker returns to duty.
Station 10:	Safety Boot Removal	10. Remove safety boots and deposit in container with plastic liner.
Station 11:	Splash Suit Removal	11. With assistance of helper, remove splash suit. Deposit in container with plastic liner.
Station 12:	Inner Glove Rinse	12. Wash inner gloves with decon solution.
Station 13:	Inner Glove Wash	13. Rinse inner gloves with water.
Station 14:	Face Piece Removal	14. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers.
Station 15:	Inner Glove Removal	15. Remove inner gloves and deposit in lined container.

FSOP 7: MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 16:	Inner Clothing Removal	16. Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit.
Station 17:	Field Wash	17. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Station 18:	Redress	18. Put on clean clothes.

FSOP 7: MINIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal	6. Facepiece is removed. Avoid touching face with fingers, Facepiece deposited on plastic sheet.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX B

LABORATORY REPORTS

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600 SOUTH 25TH STREET
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TECHNICAL REPORT

*Revised: 10/18/90

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: October 2, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 3
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106590 and 106591) were delivered to our laboratory for analysis. The field personnel identified these samples as possibly waste oil. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

A < sign indicates less than the reported value was present in the sample.

*pH value for Lab No. 106591 was changed. Also, the comments changed at the bottom of page 3.

Reviewed by _____

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

October 2, 1990
Job No. 87-911

Lab No.:	106590
Sample Description:	Barrel 13
Date and Time Sampled:	8/09/90 1525
Collected by:	Bill Clark

TOXICITY	Total Metals, mg/kg	Measured TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.035	5.0
Barium as Ba	<20	0.7	100
Cadmium as Cd	<1	<0.005	1.0
Chromium as Cr	7	0.04	5.0
Lead as Pb	143	0.94	5.0
Mercury as Hg	<0.17	0.0008	0.2
Selenium as Se	12	<0.035	1.0
Silver as Ag	<4	<0.02	5.0
Methyl Ethyl Ketone	<200	---	200

IGNITABILITY		
Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	13	500

CORROSIVITY, standard units		
pH	6.8	2.0-12.5

Polychlorinated Biphenyl	<50 mg/kg
Total Halogens as Cl	80 mg/kg
Methyl Isobutyl Carbinol	<400 mg/kg

This sample does not exhibit the characteristics of a hazardous waste. However, it does exceed the allowable limits for lead in a waste oil.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

October 2, 1990
Job No. 87-911
Sheet 3 of 3

Lab No.:	106591
Sample Description:	Vats in Office/Shop
Date and Time Sampled:	8/09/90 1530
Collected by:	Bill Clark

TOXICITY	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<30	<1.5	100
Cadmium as Cd	<2	<0.1	1.0
Chromium as Cr	<6	<0.3	5.0
Lead as Pb	64	3.2	5.0
Mercury as Hg	<0.18	<0.009	0.2
Selenium as Se	15	0.75	1.0
Silver as Ag	<6	<0.3	5.0
Methyl Ethyl Ketone	<200	---	200

IGNITABILITY		
Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	<8	500

CORROSIVITY, standard units		
pH	6.7	2.0-12.5

Polychlorinated Biphenyl	<5 mg/kg
Total Halogens as Cl	490 mg/kg
Methyl Isobutyl Carbinol	<400 mg/kg

This sample does not exhibit the characteristic of a hazardous waste.

Methyl ethyl ketone analysis was performed on 9/23/90.

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 4
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106583, 106586, and 106592) were delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

These samples could not be identified by field personnel as to their contents. Because they are clear, colorless to amber, nonviscous liquids, the tests include methyl ethyl ketone and methyl isobutyl carbinol. The toxicity characteristic for lab no. 106583 was determined in accordance with paragraph 1.2 of Method 1311. Other tests were performed to chemically identify the samples. These tests were selected based on the other materials believed to be present at the site.

A < sign indicates less than the reported value was present in the sample.

Reviewed by

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106583
Sample Description:	Barrel 2
Date and Time Sampled:	8/09/90 1315
Collected by:	Bill Clark

TOXICITY	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	2	5.0
Barium as Ba	<20	<20	100
Cadmium as Cd	0.08	0.08	1.0
Chromium as Cr	<3	<3	5.0
Lead as Pb	12	12	5.0
Mercury as Hg	<0.04	<0.04	0.2
Selenium as Se	<3	<3	1.0
Silver as Ag	<3	<3	5.0
	Total Volatiles		
Methyl Ethyl Ketone	<200	<200	200

IGNITABILITY		
Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	<15	500

CORROSIVITY, standard units		
pH	12.9	2.0-12.5

Methyl Isobutyl Carbinol, %	9.1
Total Solids at 105 ° C	28.3
Total Sodium as Na, %	3.12
Total Phosphorus as P, %	0.40
Total Sulfur as S, %	2.3
Total Kjeldahl Nitrogen, %	1.1

Because this sample is a clear liquid containing no suspended solids, the TCLP concentrations represented are by the total metals.

This sample should be considered a hazardous waste due to its toxicity and corrosivity chacteristics.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106586
Sample Description:	Barrel 11
Date and Time Sampled:	8/09/90 1345
Collected by:	Bill Clark

TOXICITY	Measured TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<0.18	5.0
Barium as Ba	<0.1	100
Cadmium as Cd	0.008	1.0
Chromium as Cr	<0.02	5.0
Lead as Pb	<0.02	5.0
Mercury as Hg	<0.002	0.2
Selenium as Se	<0.18	1.0
Silver as Ag	<0.03	5.0
Methyl Ethyl Ketone	<200	200

IGNITABILITY		
Closed Cup Flash Point	115 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	<15	500

CORROSIVITY, standard units		
pH	2.4	2.0-12.5

Methyl Isobutyl Carbinol, %	100
Total Solids at 105 ° C	<1
Total Sodium as Na, %	0.01

This sample exhibits the hazardous waste characteristics of ignitability.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 4 of 4

Lab No.:	106592
Sample Description:	Barrel 1
Date Sampled:	8/10/90
Collected by:	Bill Clark

TOXICITY	Measured TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<0.18	5.0
Barium as Ba	<0.1	100
Cadmium as Cd	<0.005	1.0
Chromium as Cr	<0.02	5.0
Lead as Pb	<0.02	5.0
Mercury as Hg	<0.006	0.2
Selenium as Se	<0.18	1.0
Silver as Ag	<0.02	5.0
Methyl Ethyl Ketone	<200	200

IGNITABILITY		
Closed Cup Flash Point	111 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.12	250
Reactive Sulfide as S	<9.3	500

CORROSIVITY, standard units		
pH	7.0	2.0-12.5

Methyl Isobutyl Carbinol, %	93.3
Total Solids at 105 ° C	<1
Total Sodium as Na, %	<0.01

This sample exhibits the hazardous waste characteristics of ignitability.

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 3
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106575 and 106576) were delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

These samples were identified by field sampling personnel as possibly being anhydrous sodium sulfite. Based on this information, the analytical scheme was designed to include sodium, sulfur and sulfite tests to identify the sample.

Because of the possibility of reaction of the sample labeled Lab No. 106575 with acids to form toxic sulfur gases in the TCLP test, a total metals analysis was performed to determine toxicity in accordance with paragraph 1.2 of Method 1311. Theoretical concentrations were calculated based on the dilution factor of 20 required by the extraction.

A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106575
Sample Description:	A Sacks Sodium Sulfite Anhydrous
Date and Time Sampled:	8/09/90 1205
Collected by:	Bill Clark

TOXICITY	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	2	0.1	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<0.9	<0.05	1.0
Chromium as Cr	<4	<0.2	5.0
Lead as Pb	14	0.7	5.0
Mercury as Hg	<1.0	<0.05	0.2
Selenium as Se	<3	<0.15	1.0
Silver as Ag	<4	<0.2	5.0

IGNITABILITY		
Closed Cup Flash Point	This sample is a solid that, when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	<1.0	500

CORROSIVITY, standard units		
pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	38.2
Total Sulfite as SO_3, %	47.5
Total Sulfur as S, %	27.0
Total Solids at 105 ° C, %	100

This sample does not exhibit the characteristics of a hazardous waste.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106576
Sample Description:	Spill Adjacent to A
Date and Time Sampled:	8/09/90 1210
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Actual TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	71	0.60	5.0
Barium as Ba	<30	<0.4	100
Cadmium as Cd	3	0.22	1.0
Chromium as Cr	<6	<0.02	5.0
Lead as Pb	230	<0.07	5.0
Mercury as Hg	<1.1	<0.0005	0.2
Selenium as Se	<5	<0.07	1.0
Silver as Ag	<6	<0.15	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid that, when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	<1.0	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	28.2
Total Sulfite as SO_3, %	22.0
Total Sulfur as S, %	18.2
Total Solids at 105 ° C, %	74.9

This sample does not exhibit the characteristics of a hazardous waste.

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 2
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, this sample of solid waste (laboratory number 106587) was delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following page.

The field personnel identified the samples as possibly containing American Cyanamid SuperFloc 330. The tests were selected based on material safety data to chemically identify the sample contents. The toxicity was estimated by measuring the total metals concentration and calculating a TCLP extract concentration (paragraph 1.2 of Method 1311).

A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 2 of 2

Lab No.:	106587
Sample Description:	Barrel 12
Date and Time Sampled:	8/09/90 1400
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<1	<0.05	1.0
Chromium as Cr	<4	<0.2	5.0
Lead as Pb	33	1.6	5.0
Mercury as Hg	<0.17	<0.0085	0.2
Selenium as Se	<3	<0.15	1.0
Silver as Ag	<4	<0.2	5.0

IGNITABILITY

Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.25	250
Reactive Sulfide as S	<20	500

CORROSIVITY, standard units

pH	5.4	2.0-12.5

Total Solids at 105 ° C	Cannot be accurately determined
Total Sodium as Na, %	0.65
Total Kjeldahl Nitrogen as N, %	4.8

This sample does not exhibit the characteristics of a hazardous waste.

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 3
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106588 and 106589) were delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

These samples were identified by sample collection personnel as possibly being methyl ethyl ketone or methyl isobutyl carbinol. However, their black, viscous liquid appearance indicates they contain other materials possibly in addition to these. Tests were performed in order to chemically identify the contents of the samples. These were selected based on information from field personnel which identified materials that were possibly at the site.

A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106588
Sample Description:	Container B
Date and Time Sampled:	8/09/90 1415
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	77	3.85	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<1	<0.05	1.0
Chromium as Cr	6	<0.3	5.0
Lead as Pb	22	1.1	5.0
Mercury as Hg	<4	<0.2	0.2
Selenium as Se	<4	<0.2	1.0
Silver as Ag	10	0.5	5.0
Total Volatiles			
Methyl Ethyl Ketone	<200	<10	200

IGNITABILITY

Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	<7.5	500

CORROSIVITY, standard units

pH	7.1	2.0-12.5

Total Solids at 105 ° C	Cannot be accurately determined
Methyl Isobutyl Carbinol, mg/kg	<500
Total Sodium as Na, %	<0.02
Total Sulfur as S, %	1.3
Hydroxide as OH, %	<0.01
Total Phosphorus as P, %	4.15
Total Kjeldahl Nitrogen as N, %	4.3

This sample does not exhibit the characteristics of a hazardous waste.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 3 of 3

Lab No.:	106589
Sample Description:	Container C
Date Sampled:	8/09/90
Collected by:	Bill Clark

TOXICITY	Measured TCLP, mg/kg	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	4	5.0
Barium as Ba	<20	100
Cadmium as Cd	<1	1.0
Chromium as Cr	<4	5.0
Lead as Pb	22	5.0
Mercury as Hg	<0.14	0.2
Selenium as Se	<4	1.0
Silver as Ag	<4	5.0
Methyl Ethyl Ketone	<200	200

IGNITABILITY		
Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg		
Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	33	250

CORROSIVITY, standard units		
pH	1.4	2.0-12.5

Total Solids at 105 ° C	Cannot be accurately determined
Methyl Isobutyl Carbinol, mg/kg	<400
Total Sodium as Na, %	<0.02
Total Sulfur as S, %	1.5
Hydroxide as OH, %	<0.01
Total Phosphorus as P, %	1.31
Total Kjeldahl Nitrogen as N, %	0.73

This sample exhibits the hazardous waste characteristics of corrosivity and toxicity.

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 3
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106584 and 106585) were delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

The field personnel identified the samples as possibly containing American Cyanamid Aerofloat 340 Promoter. The tests were performed to chemically identify the sample contents. These were selected based on material safety data provided by the American Cyanamid Company. The toxicity was estimated by measuring the total metals and calculating a theoretical TCLP extract concentration (paragraph 1.2 of Method 1311).

A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106584
Sample Description:	Barrel 3
Date and Time Sampled:	8/09/90 1320
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	9	0.45	5.0
Barium as Ba	<30	<1.5	100
Cadmium as Cd	<2	<0.1	1.0
Chromium as Cr	6	<0.3	5.0
Lead as Pb	24	1.2	5.0
Mercury as Hg	<0.11	<0.0055	0.2
Selenium as Se	<5	<0.25	1.0
Silver as Ag	<6	<0.3	5.0
	Total Volatiles		
Methyl Ethyl Ketone	<200	<10	200

IGNITABILITY

Closed Cup Flash Point	100 ° F	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	510	500

CORROSIVITY, standard units

pH	1.7	2.0-12.5

Total Solids at 105 ° C	Cannot be accurately determined
Total Sodium as Na, %	<0.03
Total Phosphorus as P, %	4.7
Total Sulfur as S, %	1.0
Total Kjeldahl Nitrogen as N, %	0.35
Methyl Isobutyl Carbinol, mg/kg	<400

This sample exhibits the hazardous waste characteristics of ignitability, corrosivity and reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911

Lab No.:	106585
Sample Description:	Barrel 4
Date and Time Sampled:	8/09/90 1330
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	4	4	5.0
Barium as Ba	<20	<20	100
Cadmium as Cd	<1	<1	1.0
Chromium as Cr	4	4	5.0
Lead as Pb	9	9	5.0
Mercury as Hg	<0.08	<0.08	0.2
Selenium as Se	<3	<3	1.0
Silver as Ag	<4	<4	5.0
	Total Volatiles		
Methyl Ethyl Ketone	<200	<200	200

IGNITABILITY

Closed Cup Flash Point	>150 ° F	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	56	500

CORROSIVITY, standard units

pH	10.0	2.0-12.5

Total Solids at 105 ° C	Cannot be accurately determined
Total Sodium as Na, %	<0.02
Total Phosphorus as P, %	3.93
Total Sulfur as S, %	1.1
Total Kjeldahl Nitrogen as N, %	4.1
Methyl Isobutyl Carbinol, %	3.9

This sample exhibits the hazardous waste characteristics of toxicity.

ien-Northern, Inc.

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600 SOUTH 25TH STREET
P. O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 26, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 2
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these soil samples (laboratory numbers 106593 and 106594) were received in our laboratory for analysis. Total petroleum hydrocarbon determinations were made in accordance with Environmental Protection Agency Method 418.1. Polychlorinated biphenyls were determined by Energy Laboratories, Inc. of Billings, Montana.

The test results are shown on the following page. A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 26, 1990
Job No. 87-911

Lab No.:	106593	106594
Sample Descriptin:	H Soil by Office Shop	I Soil by Shed
Date Sampled:	8/10/90	8/10/90
Collected by:	Bill Clark	Bill Clark
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg		
As Received:	61,000	48,000
Dry Basis:	64,000	50,500
Polychlorinated Biphenyls, mg/kg		
As Received:	<2.0	<2.0
Dry Basis:	<2.1	<2.1
Moisture, %	5.3	5.0

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TECHNICAL REPORT

REPORT TO: CHEN-NORTHERN, INC.
ATTN: MR. BILL CLARK
P O BOX 4699
HELENA, MT 59601

DATE: September 25, 1990
JOB NUMBER: 87-911
SHEET: 1 OF 7
INVOICE NO.: 104215

REPORT OF: Solid Waste Analysis - Nellie Grant Mine

Sample Identification:

On August 14, 1990, these samples of solid waste (laboratory numbers 106577 - 106582) were delivered to our laboratory for analysis. The tests were conducted in accordance with the U.S. Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd Edition, November 1986 and 40 CFR Part 302 Method 1311 published June 29, 1990. The results of the analysis are shown on the following pages.

These samples were identified by field personnel as possibly containing sodium isopropyl xanthate. All six samples consisted of yellow to white, mottled, dry pellets. Because material safety data for sodium isopropyl xanthate indicated that under heated conditions or when exposed to acids, this material would liberate toxic sulfur gases, the toxicity was estimated by measuring total metals and calculating a theoretical TCLP extract concentration. (Paragraph 1.2 of Method 1311.)

A < sign indicates less than the reported value was present in the sample.

Reviewed by Kathleen A. Smith

rmr

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 2 of 7

Lab No.:	106577
Sample Description:	Barrel 5
Date and Time Sampled:	8/09/90 1235
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<40	<2	100
Cadmium as Cd	<2	<0.1	1.0
Chromium as Cr	<7	<0.35	5.0
Lead as Pb	<7	<0.35	5.0
Mercury as Hg	<1.0	<0.05	0.2
Selenium as Se	8	0.4	1.0
Silver as Ag	<7	<7	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	3600	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	15
Total Sulfur as S, %	11.5
Total Sulfide as S, %	7.3
Total Hydroxide as OH, %	0.44
Total Solids at 105 ° C	56.8

This sample exhibits the hazardous waste characteristic of Reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 3 of 7

Lab No.:	106578
Sample Description:	Barrel 6
Date and Time Sampled:	8/09/90 1240
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<40	<2	100
Cadmium as Cd	<2	<0.1	1.0
Chromium as Cr	<8	<0.4	5.0
Lead as Pb	<8	<0.4	5.0
Mercury as Hg	<1.0	<0.05	0.2
Selenium as Se	<6	<0.3	1.0
Silver as Ag	<8	<0.4	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	2600	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	14.4
Total Sulfur as S, %	23.5
Total Sulfide as S, %	7.8
Total Hydroxide as OH, %	0.96
Total Solids at 105 ° C	52.3

This sample exhibits the hazardous waste characteristic of Reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 4 of 7

Lab No.:	106579
Sample Description:	Barrel 7
Date and Time Sampled:	8/09/90 1244
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<30	<1.5	100
Cadmium as Cd	<2	<0.1	1.0
Chromium as Cr	<7	<0.35	5.0
Lead as Pb	<7	<0.35	5.0
Mercury as Hg	<1.2	<0.06	0.2
Selenium as Se	<5	<0.25	1.0
Silver as Ag	<7	<0.35	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	7700	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	14.1
Total Sulfur as S, %	19.0
Total Sulfide as S, %	3.9
Total Hydroxide as OH, %	0.31
Total Solids at 105 ° C	43.0

This sample exhibits the hazardous waste characteristic of Reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 5 of 7

Lab No.:	106580
Sample Description:	Barrel 8
Date and Time Sampled:	8/09/90 1248
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<1	<0.05	1.0
Chromium as Cr	<4	<0.2	5.0
Lead as Pb	<4	<0.2	5.0
Mercury as Hg	<1.0	<0.05	0.2
Selenium as Se	<6	0.3	1.0
Silver as Ag	<4	<0.2	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	7100	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	16.2
Total Sulfur as S, %	15.1
Total Sulfide as S, %	4.0
Total Hydroxide as OH, %	0.35
Total Solids at 105 ° C	44.4

This sample exhibits the hazardous waste characteristic of Reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 6 of 7

Lab No.:	106581
Sample Description:	Barrel 9
Date and Time Sampled:	8/09/90 1250
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<1	<0.05	1.0
Chromium as Cr	<5	<0.25	5.0
Lead as Pb	8	0.4	5.0
Mercury as Hg	<1.2	<0.06	0.2
Selenium as Se	<4	<0.2	1.0
Silver as Ag	<5	<0.25	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.05	250
Reactive Sulfide as S	2200	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	13.8
Total Sulfur as S, %	12.5
Total Sulfide as S, %	3.4
Total Hydroxide as OH, %	0.17
Total Solids at 105 ° C	51.8

This sample exhibits the hazardous waste characteristic of Reactivity.

SOLID WASTE ANALYSIS
NELLIE GRANT MINE
CHEN-NORTHERN, INC. - HELENA, MT

September 25, 1990
Job No. 87-911
Sheet 7 of 7

Lab No.:	106582
Sample Description:	Barrel 10
Date and Time Sampled:	8/09/90 1252
Collected by:	Bill Clark

TOXICITY

	Total Metals, mg/kg	Theoretical TCLP, mg/l	EPA Maximum for Non-Hazardous Waste mg/l
Arsenic as As	<2	<0.1	5.0
Barium as Ba	<20	<1	100
Cadmium as Cd	<0.8	<0.04	1.0
Chromium as Cr	<3	<0.06	5.0
Lead as Pb	12	0.6	5.0
Mercury as Hg	<1.0	<0.05	0.2
Selenium as Se	<4	<0.2	1.0
Silver as Ag	<4	<0.2	5.0

IGNITABILITY

Closed Cup Flash Point	This sample is a solid and when exposed to open flame, does not sustain combustion	140 ° F

REACTIVITY, mg/kg

Reactive Cyanide as CN	<0.10	250
Reactive Sulfide as S	4300	500

CORROSIVITY, standard units

pH	This sample is a solid	2.0-12.5

Total Sodium as Na, %	13.5
Total Sulfur as S, %	14.0
Total Sulfide as S, %	4.1
Total Hydroxide as OH, %	0.30
Total Solids at 105 ° C	39.7

This sample exhibits the hazardous waste characteristic of Reactivity.

APPENDIX C

PERSONS CONTACTED

PERSONS CONTACTED

Mr. Tom Whites, Montana Tunnels, Jefferson City, Montana, 933-8314

Ms. Kathy Roos, Special Resources Management, Butte, Montana, 494-2500

Ms. Nora Bessler, Montana Oil Processing, Great Falls, Montana, 761-4503

Ms. Pat Bond, American Cyanamid, 801-298-9381

Mr. Ray Tilman, Montana Resources Inc., Butte, Montana, 723-4081